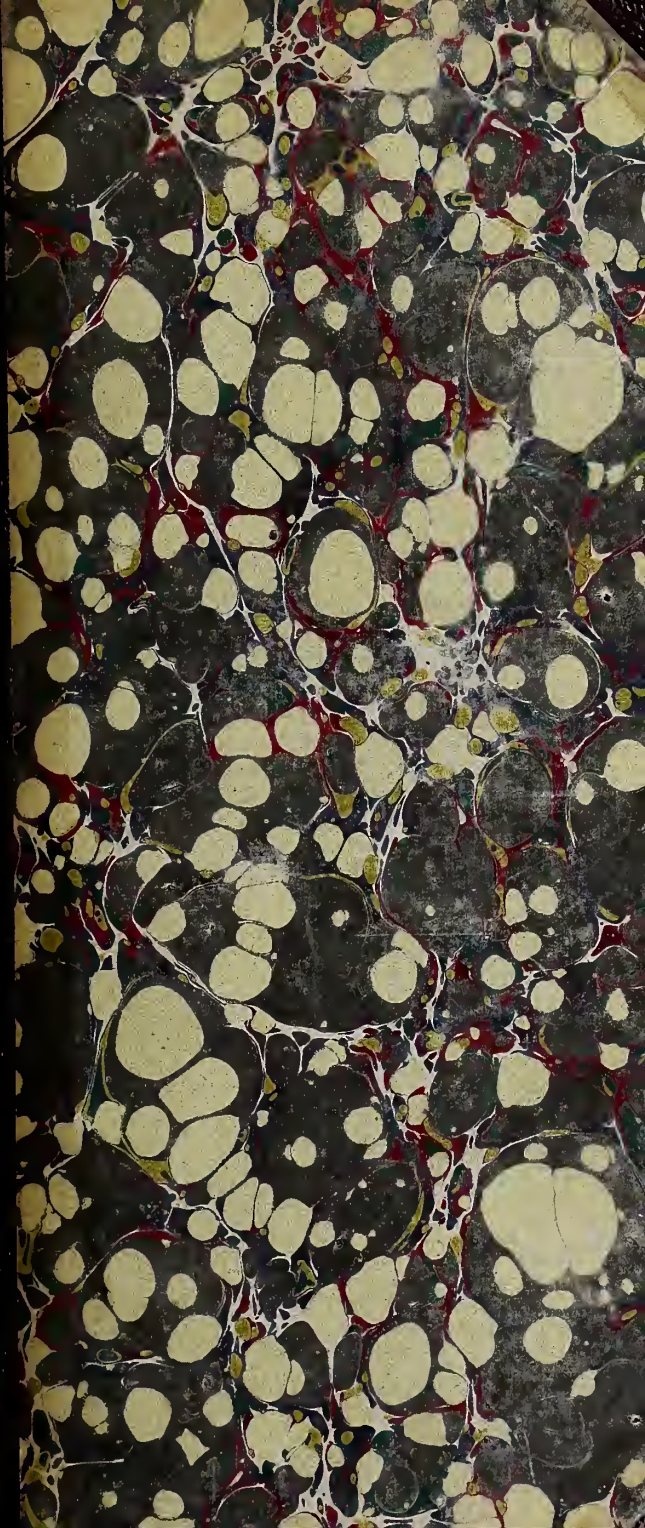


Digitized by the Internet Archive
in 2016

https://archive.org/details/journalofasiatic1833asia

JOURNAL

OF THE

ASIATIC SOCIETY.

SEPTEMBER, 1849.

An Eighteenth Memoir on the Law of Storms in India, being the Cyclone of 12th to 14th October 1848, *in the Bay of Bengal. By* HENRY PIDDINGTON, *President of Marine Courts.*

[Throughout this paper the word CYCLONE designates a Circular Storm.—H. P.]

(*Concluded from page* 857.)

I proceed now to give in a Tabular form the winds and weather experienced by the various ships and stations during the Cyclone, at noon on different days, from which its gradually reaching and strength at the spot will be seen, and at the same time many of the effects preceding the onset of the bad weather, as contrasted with those actually undergone by other vessels at the same time, at no great distance from them.

Tabular View of the Winds and Weather for the Cyclone of Oct. 1848, *in the Bay of Bengal at Noon.*

Date,	*No.*	*Name of Ship or Station.*	*Lat. N.*	*Long. East.*	*Winds and Weather.*	*Bar.*	*Simp.*	*Ther.*	*Remarks.*
1848. 9th Oct.	1	Joven Corinna,	14°47′	91°54′	E.N.E.; Noon East, strong gales.	29.65	29.10	85°	Heavy swell from E. S. E.; 8 P. M. to midnight moderate.
	—	AT KYOOK PHYOO.	19.26	93.34	Light breezes N. E. to E. S.E. and hot sultry weather	29.90		87°	Sky clear.

Date.	*No.*	*Name of Ship or Station.*	*Lat. N.*	*Long. East.*	*Winds and Weather.*	*Bar.*	*Simp.*	*Ther.*	*Remarks.*
1848. 10th Oct.	1	Joven Corinna.	15° 13′	93. 48.	S. b. W. to S. S. W. and S., squalls to S. W. rain and sea.	....	8 A. M. 29. 84.	....	At midnight in 50 fs.
	2	Brig Teak.	15. 37.	92. 29.	4 A. M. nearly calm; 8 steady S. S. E. Noon South; 2 P. M. strong squall S. W.; 3, W. S.W. strong gale and fierce squalls, 6, S. W.	29. 67.	29. 10.	85°.	At 8 moderating a little, but at midnight as before; dense strata and nimbi.
	3	Enigma.	15. 17.	93. 10.	Fresh gale S. S. W. at Noon, and South P.M.; 4 P. M. S. S. W. and at 10 S. W.	....	....	....	Ship running to the N. W.
		At Kyook Phyoo.	19. 26.	93. 34.	Blowing fresh E. S. E. and cloudy.	29. 88.	....	86	....
	4	Eagle.	19. 44.	90. 35.	Steady E. N. E. breeze and fine. Wind Easterly till midnight. Sunset smart gales, E. b. N.	29. 30.	....	84	....
	5	Ararat.	15. 41.	92. 45.	Squally and variable S. S. W.	....	....	....	Studding-sails set.
	6	Flora McDonald.	20. 34.	92. 15.	Light breezes E. N. E and cloudy; P. M. calm and cloudy 9 P. M. E. N. E. strong gales and cloudy.	....	....	....	At anchor till 9 P. M. off St. Martin's Island.

10th Oct.	7	Barham.	15°. 40′.	86°. 15′.	P. M. Fresh unsteady breeze Northerly; and squally to hard squalls.	29. 72.	29. 45.	84°	Heavy swell from the Eastward; making preparations for bad weather. Midnight Bar. 29. 65; Simp. 29.36.
	8	Wellesley.	13. 40.	83. 45.	N. Wy. breeze.	....	....	....	....
	12	Camperdown.	20. 17.	89. 03.	Light airs and calms.	....	....	....	Noon Floating Light N. E. b. N. 50 miles.
	17	John Hepburn.	19. 28.	88. 33.	Winds variable and light; East to E. N. E.	29. 67.	....	87	P. M. moderate; sunset weather becoming unsettled from the Eastward; swell from the S. E.
	18	Easurain.	21. 6.	86. 16.	Light airs S. E.; midnight fresh breezes E. b. N. and fine.	....	....	....	....
11th Oct.	1	Brig Teak.	15. 19.	91. 26.	South to 6 A. M. then S. S. E. throughout with heavy squalls.	29. 65. 2 P. M. 29. 60.	....	81	Running to the W. N. W. 5 ks. to 9 knots. Midnight strong gale and high sea.
	2	Joven Corinna.	15. 21.	94. 20.	A. M. S. S. W. fierce gale and fearful squalls, moderating to Noon, when South; P. M. S. S. E. increasing to midnight.	29. 70.	29. 17.	84	Noon only fresh winds and cloudy; midnight dense strata from S. E.

Date.	*No.*	*Name of Ship or Station.*	*Lat. N.*	*Long. East.*	*Winds and Weather.*	*Bar.*	*Simp.*	*Ther.*	*Remarks.*
1848. 11th Oct	3	Enigma.	17° 24′	90° 55′	Strong gales S. S. E. at 8h S. E.; at Noon drizzling rain and sea getting up.	....	....	....	P. M. a tremendous squall, S. E.
		At KYOOK PHYOO.	19. 26.	93. 34.	Blowing fresh, East to E. S. E. light rain and squally appearances.	29. 84.	....	81	....
		At AKYAB.	20. 08.	92. 55.	Wild aspect, cloudy thunder, lightning and rain; wind from North and East; A. M. wind E. S. E.	29. 60.	....	....	....
	4	Eagle.	19. 6.	91. 15.	A. M. East to E. N. E. 8 A. M. E. S. E. midnight E. S. E.	29. 15.	....	....	P. M. moderate, with a heavy sea from the Eastward; 4 P. M. smart gales increasing throughout the night to a heavy gale E. S. E. Bar. midnight 29.00.
	5	Ararat.	17. 20.	91. 37.	Fresh breeze S. E. and cloudy; P. M. cloudy and puffy.	29. 81.	....	....	Running 8 knots to the N. W. b. N.; at 5h. 30 under close reefs.
	6	Flora McDonald.	19. 56.	92. 0.	A. M. E. S. E. increasing to a strong gale and heavy sea at Noon, when wind S. E. P. M.	....	....	....	Gale, rain and squalls in heavy gusts to midnight.

11th Oct.	7	Barham.	15°. 22′.	87°. 16.	A. M. very hard squalls, W. N. W. Noon variable P. M. S. W. S. light air and calms 6h. N. W. 9h W. N. W.	29. 68.	29. 38.	84°	7 A. M. weather moderating; 6 P. M. hard squall from N. W. high sea, much lightning at midnight.
	8	Wellesley.	15. 15.	86. 8.	N. W. to W. N. W. P. M. arched squalls from N. E.	....	....	....	Dark lurid appearance to the Eastward, getting more dense, and hot stifling feeling towards Noon. Clouds in dark masses flying to West.
	9	Sea Park.	16. 57.	90. 02.	Wind variable S. S. W. to S. E. and East and fine; P. M. East, veering to N. E. weather looking dirty.	10 A. M. 29. 70.	29. 30.	....	5 P. M. Bar. 29.60; Simp. 29.20; Bar. falling, variable to midnight.
	10	Asiatic.	20. 7.	86. 56.	A. M. Light variable breezes N. N. W. and East; Noon squally from North.	8 P. M. 29. 60.	....	....	8 P. M. increasing. Ship standing to the Eastward.
	11	Sir Robt. Seppings.	18. 55.	86. 16.	To Noon fresh Northerly and N. N. E. breeze; midnight strong Northerly breezes.	29. 90.	....	89	Heavy head sea throughout; midnight much lightning to the Eastward. Ship standing to the Eastward throughout.
	12	Camperdown.	20. 32.	....	Squally, rain and light airs and calms.	....	....	....	Ship standing to the S. E. A cross sea but no appearance of bad weather.

Date.	*No.*	*Name of Ship or Station*	*Lat. N.*	*Long. East.*	*Winds and Weather.*	*Bar.*	*Simp.*	*Ther.*	*Remarks.*
1848. 11th Oct.	13	Collingwood.	16° 21′	88° 38′	Fine weather, wind from N. East 4 and 5 knot breezes P. M. cloudy and variable from N. and N. E. to midnight.	29. 67.	....	83°	Ship standing to the N. W.
	14	Edmundsbury.	....	....	Variable from E. S. E. 6.30 E. N. E. increasing.	....	....	....	Anchored with Pilot on board; at 6.30 stood to sea with a strong breeze at E. N. E. increasing; midnight Bar. 29.65.
	15	Framjee Cowasjee.	....	....	P. M. wind E. N. E. and light to midnight.	....	....	....	Received a Pilot at 7. 30 A. M. Noon abreast the Floating Light.
		At Balasore.	21. 28.	87. 12.	S. E. to N. W. Lightning to S. E. East and West, rain from S. E. with heavy clouds.	29. 68.	....	83	Bar. falling; from 29. 74 to 29. 72.
	16	Washington Alston.	20. 15.	88. 36.	P. M. squally and rain E. N. E. to E. S. E. and a large sea. Midnight moderate.	....	....	....	Ship standing to the S. S. E.
	17	John Hepburn.	18. 18.	89. 06.	Light winds and squally E. N. E. P. M. cloudy threatening E. N. E. to S. E.	29. 61.	....	86.	Heavy swell from the S. E. Bar. 29.50; midnight dark cloudy weather.

	18	Easurain.	19°. 36′.	87°. 38.	3. A. M. E. b. S. 7 N. N. E. to Noon when squally.	....	....	....	....
	19	Futtle Rozack.	....	....	P. M. wind East.	1 P. M. 29. 70.	....	84	P. M. Lower F. L. E. ½ S. 5 weather looking bad.
				H.	C. PILOT AND LIGHT	VESSELS.			
		H. C. P. V. Fame.			Wind S. E. to East Noon; P. M. Easterly, strong breeze and heavy rain.	8 A. M. 3. 7. Noon 30. 1. 4 P. M. 29. 95.	....	....	Noon at anchor F. L. V. N. E. by E. ½ E.
		H. C. P. V. Colleroon, Eastern Channel.	....	....	A. M. East to S. E. 7 P. M. strong Easterly breezes and clear weather.	8 A M. 29. 86. Noon 29. 84. 8 P. M. 29. 81.	....	81 86 84	At anchor mostly. South Channel Buoy South 4′.
12th Oct.	1	Brig Teak.	18. 9.	90. 00.	S. S. E. to 3 A. M. when South and S. S. E.; at 8 P. M. S. S. E. 4 P. M. S. E. furious gale and sea a sheet of foam.	29. 50.	30. 10.	82	Running to W. N. W. P. M. hove too. Midnight clearing a little, Bar. at 6 P. M. 29.42, and at 10 29.62; Simp. 30.5 to 30.20.

Date.	*No.*	*Name of ship or Station.*	*Lat. N.*	*Long. East.*	*Winds and Weather.*	*Bar.*	*Simp.*	*Ther.*	*Remarks.*
1848. 12th Oct.	2	Joven Corinna.	15° 25′	94° 14′	Strong squalls, rain and thick gloomy weather; strong wind from S. b. W. to S. S. W. and S. W. veering to South and S. b. E.	29. 70.	29. 17.	82½	Clouds, dense strata throughout; towards midnight inclined to clear up.
	3	Enigma.	19. 19.	90. 28.	P. M. E. S. E. midnight S. E. strong gales, continued heavy squalls.	....	....	....	Vessel scudding to the N. W.
		At KYOOK PHYOO.	19. 26.	93. 34.	Blowing fresh, East to S. S. E. light rain and squally appearance.	29. 80.	....	83	....
		At AKYAB.	20. 08.	92. 55.	Daylight wind E. S. E. P. M. the same; strong squalls to midnight.	29. 65.	....	....	....
	4	Eagle.	20. 02.	90. 30.	Heavy gales E. S. E. to 4 P. M. when S. E.	29. 20.	....	.. :	....
	5	Ararat.	19. 11.	89. 6.	A. M. E. b. N. Noon N. E. increasing gale P.; M. N. E. b. E. 10 P. M. very hard gale.	29. 50.	....	....	Barometer falling and sea getting up.
	6	Flora Mcdonald.	16. 47.	91. 16.	E. S. E. strong gales P. M. S. E. b. E.	....	....	....	Same weather to midnight.

12th Oct.	7	Barham.	16°. 51′.	88°. 23′.	A. M. unsteady breeze N. W. Noon thick with hard squalls. P. M. W. S. W. at 7. Midnight S. S. W. hurricane.	29. 40.	29. 12.	...	Daylight Bar. 29.70; out 2 reefs; birds flying on board. Noon hove to, 4 P. M. Bar. 29.20.
	8	Wellesley.	16. 20.	87. 00.	Wind West, gusty and increasing; 3 P. M. West; Midnight veering to S. west.	29. 60.	29. 08.	83°	3 P. M. Hove too, to midnight torrents of rain, and lightning; 8 P. M. Bar. 29.50; Simp. 29. 00.
	9	Sea Park.	17. 54.	89. 26.	First variable airs to 2.30 P. M. when Southerly breeze; midnight S. S. E. hard gale and heavy gusts of wind and rain.	10 A. M. 29. 38.	....	....	Bar. and Simpiesometer falling, when the rise should take place. Ship covered with land birds and hove to 4 P. M. in 18°.6′. N. 89°.25′. East.
	10	Asiatic.	19. 32.	88. 19.	Noon N. E. gale and close reefs; midnight East, heavy gales.	4 P. M. 29. 40.	....	....	Bar. from 4 P. M. falling from 29.40 to 28. 94 at midnight.
	20	British Sovereign.	16. 37.	88. 38.	A. M. variable, North to W. N. W.; 4 heavy squalls from North; 6 gale at West; Noon W. S. W. thick dark cloudy weather; 9 S. W. b. W.; midnight S. W. furious hurricane.	29. 50.	....	....	Ship running to the North; at 8 P. M. hove too in 17° 17′ N.; 88° 35′ East; heavy thunder and lightning; Bar. 29.50 at P. M. to 29.20 at midnight.

Date.	*No.*	*Name of Ship or Station.*	*Lat. N.*	*Long. East.*	*Winds and Weather.*	*Bar.*	*Simp.*	*Ther.*	*Remarks.*
12th Oct.	21	Chas. Kerr.	19° 36′	87° 52′	2 A. M. increasing breeze; Noon hard gales N. N. E. midnight wind North.	29. 60.	29. 30.	82	Midnight 11th Black Pagoda N. W. b. W. 3 miles. Ship standing to the Eastward. Midnight 29.50; Simp. 29.20.
	11	Sir Robt. Seppings.	19. 27.	87. 20.	Strong Northerly breezes P. M. North, strong gale and heavy rain and squalls.	29. 70.	....	86	8 P. M. Bar. 29.55 and gale increasing, hove too. Midnight 29.50, hard gale.
	12	Camperdown.	....	....	....	29. 60.	....	....	Noon Pilot Vessel N. N. E. 15.′ Stood to the S. E. 11 P. M. hard squalls.
	13	Collingwood.	17. 46.	89. 06.	Variable from N. west and squally; P. M. variable N. westward; 4 West; 7 S. b. E. to S. S. E. at 10 S. E. b. S. increasing rapidly.	29. 37.	....	....	Standing to N. N. E. and N. E. 3 P. M. Bar. 29.25 and falling fast; midnight ship running to the N. E. b. N.
	14	Edmundsbury.	2 Alts. 19. 53.	88. 11.	Fresh gale; strong squalls, wind N. E. to East; 5 P. M. strong gale East to N. E. midnight hard gale.	29. 60.	....	....	Noon heavy appearance to the Eastward. Midnight Bar. 29.50

12th Oct.	15	Framjee Cowasjee.	20. 18.	88. 27.	Noon heavy squalls, to midnight increasing gale from E. b. N.	29. 46.	....	....	Working to the Eastward, heavy Westerly set; 9.30 P. M. hove too. Midnight in about 20°.0′ N. 88°.37′ East.
		At Balasore.	....	....	N. W. breeze, very cloudy, rain from N. E. with heavy gusts.	29. 64.	....	82½	....
	16	Washington Alston.	19. 2.	88. 46.	Wind E. N. E. P. M. heavy gales; 5 P. M. East; 10 P. M. S. E.	....	....	....	5.30 P. M. hove too; midnight very heavy gale.
	17	John Hepburn.	17. 35.	89. 36.	Winds light and variable from N. E.; 9 light winds S. E. Noon squally, P. M. increasing 2.30 strong gales S. E. 6 P. M. to midnight, hurricane.	....	....	....	Very threatening appearance to the S. westward, Bar. A. M. 29.38; 7, 29.30; Ther. 82.—Dense black appearance to the S. W. P. M. Bar. falling fast, 9 Bar. 29.9.
	18	Easurain.	17. 05.	86. 06.	A. M. N. W. freshening gale; 8 W. b. N. P. M. moderating N. W. b. W. and W. N. W.; at 8 light airs.	....	....	....	
	19	Futtle Rozack.	19. 18.	87. 45.	A. M. wind variable E. N. E. to E. S. E. 3 A. M. shift to N. N. E. P. M. N. N. E. dark gloomy weather.	29. 59.	....	....	10 A. M. Dark red clouds about 5° in Alt. Ship running to the S. W. and South.

Date.	*No.*	*Name of Ship or Station.*	*Lat. N.*	*Long. East.*	*Winds and Weather.*	*Bar.*	*Simp.*	*Ther.*	*Remarks.*
12th Oct.				H.	C. PILOT AND LIGHT	VESSELS.			
		H. Co.'s Floating L. V. Hope.	21° 4′	88° 27′	A. M. Fresh Easterly and cloudy; 8 strong E. N. E. cloudy and squally. Noon strong N. E. b. E.; 4 P. M. strong Easterly wind, heavy sea. Midnight blowing strong at East, heavy squalls, rain and heavy sea.	29. 79.	29. 60.	86	Two Barometers on board; 4 P. M. veered to 120 fms. Sunset strong set to the Westward.
		H. C. P. V. Fame, at the F. L. V. station.	....	....	Strong winds from East and thick dirty weather with squalls; Noon to midnight N. E. to E. S. E.	8 A. M. 29. 96. Noon 29. 94. 4 P. M. 29. 86.	....	....	....
		H. C. P. V. Salween.	....	....	First part fresh breeze East to S. E. and very clear atmosphere; middle squally and latter moderate E. N. E.	29. 90.	....	....	....
		H. C. P. V. Colleroon.	....	....	Daylight strong Easterly breezes and squally, 10.30 blowing a gale from East; 8 P. M. strong gales East to E. S. E.	....	....	....	Lightning to the N. W. Bar. 8 A. M. 29 80; Noon 29.73; 4 P. M. 29.76; 8 P. M. 29.73; Ther. 84 to 85°. Riding with 160 fs. cable.

		H. C. F. L. V. Beacon, Middleton Point Station.	....	....	Noon strong E. N. E. brezees and squalls P. ; M. to midnight E. N. E. to N. E. thick cloudy weather.	Noon 29. 77. P. M. 29. 74. Mid. 29. 70.	....	80 84 84	Strong appearances of bad weather.
1848. 13th Oct.	1	Brig Teak.	18. 32.	89. 17.	Noon S. E. strong gale.	29. { 65. 63.	30. 25.	82	6 A. M. bank of clouds to the S. W. Sea running in high pyramids; 8 P. M. bore up and made sail.
	2	Joven Corinna.	15. 50.	93. 11.	Winds variable from S. b. E. and squally.	29. 73.	29. 26.	82	At midnight fine.
	3	Enigma.	....	....	Wind N. S. E. 1 P. M. East, lying too.	....	....	....	Signalled to sea again by the Pilot.
		At Kyook Phyoo.	19. 26.	93. 34.	Moderate and fine S. S. E. to N. W.	29. 80.	....	84	....
		At Akyab.	20. 08.	92. 65.	Blowing fresh East to E. S. E. strong gale S. E. Noon dark cloudy weather with heavy squalls South.	29. 50.	....	....	Midnight moderate; an immense rise of tide from Chedoba to Chittagong for miles in shore.
	4	Eagle.	19. 54.	89. 12.	Wind S. E. hard gale, squalls and heavy rain; 11 P. M. S. S. E.	29. 20.	....	....	Midnight heavy thunder and vivid lightning to the S. W. hard gales S. S.E. hove to throughout.

Date.	*No.*	*Name of ship or Station.*	*Lat. N.*	*Long. East.*	*Winds and Weather.*	*Bar.*	*Simp.*	*Ther.*	*Remarks.*
1848. 13th Oct.	5	Ararat.	19° 20′	88° 30′	6 A. M. E. S. E. terrific gale; P. M. N. E. 6. 45 hurricane S. W.	29° 00 ?*	....	....	3 P. M. Bar. 29.00; 4 28.6, 6.45; centre had passed 8h. 30; Bar. rising to 29.10. Ship surrounded with birds.
	6	Flora Macdonald.	20. 20.	90. 30.	A. M. S. E. P. M. South P. M. S. b. E. Strong gales and squalls throughout.	....	....	....	....
	7	Burham.	17. 52.	89. 14.	6 A. M. S. S. E. P. M. S. S. E. moderating.	29. 58.	29. 30.	82*h*	P. M. Bore up North. Midnight strong breeze with hard squalls, and vivid forked lightning.
	8	Wellesly.	16. 53.	88. 2.	S. W. to S. S. W. Noon wind shifting to the Southward, but still with hard squalls.	....	....	....	Bore up E. N. E. Heavy confused sea from all quarters.
	9	Sea Park.	18. 20.	89. 06.	Daylight S. E. very hard gale, P. M. S. b. E. steady Southerly gale throughout.	29. 63.	29. 35.	...	Midnight more moderate.
	10	Asiatic.	19. 8.	86. 08.	A. M. East; 7 A. M. E. N. E. hard gales Noon hurricane E. N. E.; 4 P. M. North to N. W.; midnight West	28. 86.	....	....	Bar. from 28.97; at 1 A. M. to 28.60; at 8 P. M. 29.20; at midnight when moderating.

* See Note at page —.

20	British Sovereign.	17. 38.	88. 33.	A. M. South 4 S. S. E. 6 S. E. at 8 S. S. E. 11 South ; heavy gale with rapid gusts.	29. 40.	....	....	By 8 A. M. wind abating ; Bar. 29.20 ; at 1 A. M. to 29.40 at Noon.
21	Chas. Kerr.	19. 02.	87. 27.	Gale increasing to Noon ; 10 A. M. W. N. W., noon dense atmosphere rain and sleet P. M. S. S. W. b. S. 7 South.	28. 90.	28. 70.	79	Ship keeping before the wind ; 2 P. M. glasses began to rise.
11	Sir Robt. Seppings.	19. 40.	88. 00.	A. M. East to N. E. gale P. M. N. E. hard gales ; 2 P. M. wind S. E. ; 5 S. S. E. ; 6 P. M. S. E. to South ; 7 S. S. W. ; 8 South ; midnight S. E. to S. S. W.	....	....	....	A. M. and at 2 P. M. moderating ; at 7 P. M. lost masts. Position during the height of the hurricane about 19.30 ; 87.35 E.
12	Camperdown.	....	....	Blowing hard E. N. E. to East ; Noon about East ; 7.30 P. M. hurricane from W. S. W. ; 8.30 S. S. W.	29. 00.	....	....	Close reefing Bar. 3 A. M. 29.20 ; 5 P. M. 28.90 ; at 7 28.50 ; 5 P. M. 28.90 ; at 7 28. 50, from 7 to 7.30 a lull ; midnight Bar. 28.50 ; having fallen lower in this interval.
13	Collingwood.	20. 27.	87. 30.	Noon wind E. S. E. P. M. moderate gale E. b. N. ; 4 P. M. E. N. E. ; 7.30 hurricane E. S. E. ; 10 S. E. ; 12, South.	29. 50.	....	82	Bar. 28.80 at 8 P. M. 7.30 P. M. has desmasted ; midnight hurricane still raging.

Date.	*No.*	*Name of Ship or Station.*	*Lat. N.*	*Long. East.*	*Winds and Weather.*	*Bar.*	*Simp.*	*Ther.*	*Remarks.*
1848. 13th Oct.	14	Edmundsbury.	19° 21′	87° 49′	A. M. N. E. threatening; Noon hard gale; P. M. hurricane N. E.; 6. 30 shifted to the N. W. at 8 hurricane W. b. N. midnight S. W.	29° 20′	....	....	4 P. M. more moderate and calm; 6.30 hurricane from S. W. Bar. 5 P. M. to 7 28.60; midnight 28.98; wind S. W.
	15	Framjee Cowasjee.	20. 0.	87. 30.	A. M. Heavy gale E. N. E. P. M. E. b. N.; 5 P. M. moderating; 6 hauling to North and S. W. wind W. S. W.; at 8 calmer midnight hurricane S. W.	....	....	....	Bar. at midnight 28. 90; position merely estimated.
		At BALASORE.	....	....	Shifting E. N. E. to E. S. E. heavy rain.	29. 60.	....	82	Upper clouds travelling from the S. W.
	16	Washington Alston	19, 44.	88. 03.	At 6 A. M. S. E. Noon South.	....	....	....	Ship in much distress. Before Noon dismasted.
	17	John Hepburn.	18. 50.	89. 46.	A. M. wind about S. E. moderating a little; wind veering to South.	29. 59.	....	....	Daylight Bar. 29.50.
	19	Futtle Rozack.	17. 17.	88. 5.	A. M. Blowing fearfully N. N. W. 3 A. M. N. W. b. N. 11 W. b. N. Noon more moderate; P. M. moderating west S. W. and S. W. b. S.	29. 57.	....	....	Ship running to the South and S. E.; 10 P. M. heavy squalls and thunder and lightning.

				H.	C. Pilot and Light	Vessels.			
13th Oct.		H. C. Floating Light Vessel Hope.	21. 4.	88. 27.	A. M. strong Easterly winds; 4 A. M. strong gales E. S. E. to E. N. E.; noon E. N. E.; 4 P. M. increasing at N. E. 8 P. M. E. N. E. fearful heavy gusts and rain.	8 A. M. 29. 76. Noon 29. 75. 29. 58. 4 P. M. 29. 71. 29. 50. Midnight 29. 65. 29. 50.	....	80°	Two Barometers on board, but differing greatly. Their fall from noon to midnight is 0.1 and 9.08. respectively.
		H. C. P. V. Fame, F. L. V. Station.	....	....	Daylight blowing fresh E. S. E. to East with a heavy sea; 1 P. M. weather worst; 6 heavy squalls E. S. E.; P. M. gale E. S. E. to S. E.	8 A. M. 29. 84. Noon 29. 71. 4 P. M. 29. 55.	....	....	6 P. M. Parted and stood to sea and laid too in 23 fs. water.
		H. C. P. V. Salween.	....	....	Strong gale E. N. E. latter part E. S. E. heavy squalls and gusts.	A. M. 29. 77. Noon 29. 80. 6 P. M. 29. 60.	....	....	....
		H. C. P. V. Colleroon.	....	....	5.30 A. M. heavy gale from East. Noon East to E. N. E. 3 P. M. East to S. E.; 8 P. M. East to S. E.	....	....	....	Throughout hard gales, rain and heavy sea. Bar. 8 A. M. 29.72; noon 29.80; after which obliged to unship it.

Date.	*No.*	*Name of Ship or Station.*	*Lat. N.*	*Long. East.*	*Winds and Weather.*	*Bar.*	*Simp.*	*Ther.*	*Remarks.*
1848. 13th Oct.		H. C. F.L. V. Beacon, Middleton Point Station.	....	....	To 8 P. M. strong N. E. gales with heavy squalls and rain. From 8 P. M. to midnight increasing at E. N. E. veering to East and S. E.	Noon 29. 66. 8 P. M. 29. 67. Midnight 29. 61.	....	74* 78 79	At 8 P. M. lightning all round and every appearance of worse weather.
14th Oct.	11	Sir Robt. Seppings.	19. 45.	87. 50.	1 A. M. S. S. W.; 4 A. M. South. To Noon S. b. E.; at 8 more moderate. P. M. S. S. W.	29. 10.	....	79	....
	12	Camperdown.	....	....	1 A. M. Bar. 29.00 wind S. S. W.	....	....	....	Daylight in 17 fs. False Point N. W.; 7 miles.
	13	Collingwood.	....	....	3 A. M. S. S. W.; 4 hurricane moderating; noon S. b. W. decreasing.	29. 30.	....	....	At 6 A. M. came too with False Point Light S. b. W.
	14	Edmundsbury.	20. 2.	87. 7.	4 A. M. wind S. S. W.; 11 A. M. South.	29. 60.	....	....	Moderating during the day.
	15	Framjee Cowasjee.	....	....	Hurricane from S. W. Noon moderating.	....	....	....	5 A. M. lost main and mizen masts. Daylight passed Edmundsbury in 19.45 N.; Long. 86° 38′ East; Bar. at 2.30 A. M. 29.22.

* So in the MSS.

14th Oct.	At Balasore.	....	....	6 p. m. wind E. N. E.	29. 49.	....	81	Rise of water at the tide guage 8 ft. above spring tides.
16	Washington Alston	....	....	Blowing hard S. W. all night.	....	....	....	A. M. gale abated.
			H.	C. Pilot and Light	Vessel.			
	H. C. P. F. L. Vessel Hope.	21. 4.	88. 27.	Daylight strong S. E. gales with heavy gusts of wind; 8 a. m. S. E. noon S. S. E.; 4 p. m. Southward; midnight strong S. b. W. gale; heavy squalls rain and sea throughout.	A. M. 29. 65. 29. 50. 8 A. M. 29. 76. 29. 56. Noon 29. 70. 29. 54. 8 P. M. 29. 80. 29. 60.	....	....	
	H. C. P. V. Fame.	....	....	Winds fresh S. S. E. to South throughout.	8 A. M. 29. 85. Noon 29. 91. 4 P. M. 29. 91.	....	....	4 A. M. Off Point Palmiras a little to the North of the Ridge; 3 P. M. anchored in 19 fs.
	H. C. P. V. Salween.	....	....	Fresh gale S. S. E. hard squalls and lightning.	29. 72. P. M. 29. 70.	....	....	At noon moderating.

Date.	*No.*	*Name of Ship or Station.*	*Lat. N.*	*Long. East.*	*Winds and Weather.*	*Bar.*	*Simp.*	*Ther.*	*Remarks.*
1848. 14th Oct.		H. C. P. V. Colleroon.	....	....	Continued gale East to S. E. 3 A. M. E. S. E.; 8 A. M. veering to S. S. E.; noon S. S. E. to South; P. M. from S. S. E. to South in heavy gusts.	....	....	....	A. M. the hardest squalls of the gale; P. M. lightning to the Southward and Eastward. Throughout at anchor in the South Channel.
		H. C. F. L. V. Beacon, Middleton Point Station.	....	....	Gale continuing from about S. E. till 8 P. M. when moderated at S. S. E.; midnight strong Southerly breeze.	....	....	....	Bar. 8 A. M. 29.61 and 7h. 81°; noon 29.72 and Ther. 84; P. M. 29.65; Ther. 83; 8 P. M. 29.73; Ther. 82; midnight 29.70: Ther. 81.
15th Oct.		H. C. F. L. V. Hope.	....	....	A. M. strong S. b. W. gales, heavy squalls and rain; noon S. S. W. to S. W.; 4 P. M. moderating very fast at S. W.; 8 strong S. S. W. winds; midnight fine.	....	....	....	8 A. M. Bar. 29.85 and 29.64; Ther. 82; noon 29.90 and 29.61, Ther. 82°; 4 P. M. 29.95 and 29.65.
		H. C. P. V. Colleroon.	....	....	A. M. hard gale, S. to S. b. E. moderating after noon when wind South.	....	....	....	....

Part II.—Summary.

From the foregoing details and tables I now proceed to shew upon what considerations the places of the centres of this Cyclone for the different days have been laid down, inserting here, for more convenient reference to the diagrams on the chart, a list of the numbers affixed to each ship's name in the foregoing table.

Index to the numbers of the Ships on the Chart and Diagrams.

No.		Log at page.
1.	Joven Corinna	829
2.	Teak	828
3.	Enigma	830
4.	Eagle	833
5.	Ararat	834
6.	Flora MacDonald	835
7.	Barham	835
8.	Wellesley	837
9.	Sea Park	838
10.	Asiatic	839
11.	Sir Robert Seppings	843
12.	Camperdown	844
13.	Collingwood	845
14.	Edmundsbury	846
15.	Framjee Cowasjee	848
16.	Washington Alston	851
17.	John Hepburn	852
18.	Easurain	853
19.	Futtle Rozack	854
20.	British Sovereign	846
21.	Charles Kerr	842

Before entering on the details of the positions of the centres of the Cyclone, for different days, I am desirous of making a few remarks on the positions of the ships, as shewn by their logs or the notes transmitted to me.

It will be seen that there are four differently marked classes of tracks on the chart. These are:—

1. Ships inward bound from the Southward.
2. Ships inward bound from Madras or from the Eastward.
3. Outward bound ships.
4. Ships standing to sea from the Pilot station.

Now of these four classes the ships of which the positions are the most certain are those from Madras, as having had good observations but a day or two before.

Next to these are the ships inward bound, from the Southward and those from the Eastward, though both were subjected to considerable chances of error, as some of the ships from Europe had run up from 7° North in continued gloomy weather, and those from the Eastward had had two or three days of bad weather from the Preparis passage.

The ships standing to sea, whether as outward bound or as standing off by orders from the station vessel, or under charge of their pilots, were enveloped in the strong current which I have elsewhere announced, and which we see here from the logs of several ships,* and especially the *Camperdown*, sets at a rapid rate across the Sand Heads to the Westward at the approach of a Cyclone; and it is probable also that the ships in the vicinity of the coast about Point Palmiras, and to the Southward, were much affected by the sweep of this current, which no doubt curves round within Balasore Bay and past the Point: at least we cannot reasonably suppose any other direction for it.

On the 9th of October we cannot fairly assign any position for the centre, though as the *Teak* and *Enigma* in the Andaman Sea about the latitude of Narcondam, were running up with a strong S. S. W. breeze, while the *Joven Corinna*, outside in the Bay of Bengal, had a strong Easterly breeze; these might at first have been thought part of a Cyclone circle, of which the centre in that case would fall in about 12° 30′ North; and 92° 00′ East: or about 1° West of the body of the Great Andaman, and Captain Connew, it will be seen, thinks they "brought it up from the Sayer Islands;" but at the close of the monsoons smart blowing weather is often experienced on the Eastern side of the Bay, and the next day was fine again, for—

* At the trial of a Branch Pilot before a Marine Court for failing to take a pilot out of an outward bound ship, it was proved on oath that the Westerly set at the station vessel was not less than from three to four knots per hour on the 11th October.

On the 10*th October*, we find the *Teak*, *Enigma* and *Joven Corinna* with tolerably fine weather and the wind between S. S. W. and S. E., some of the vessels carrying studding sails: we cannot thus allow that either on the 9th or 10th we have any sort of data for assuming the presence of a Cyclone, which had it existed must have had its centre to the Westward, and W. S. W. of these ships, and consequently have reached the *Sea Park* and *British Sovereign*, the next ships to the Westward, and have given them a Northerly wind. There is only one circumstance which we are a little puzzled to account for, which is the presence of the land birds and insects on the 12th on the *Sea Park* and other vessels. These it is clear must have been brought from some of the land to the Eastward or S. Eastward, that is either from the coast of Pegue above Point Negrais, or from the Andamans. We might suppose indeed that, according to Captain Conncw's view, the Cyclone existed as such within the Andaman Sea, and that it was lifted up by the high mountain range of the Andaman Islands, and descended again in the Bay, which we know to happen with Cyclones crossing the peninsula of India, and descending, or being again as it were, renewed in the Arabic Sea. This supposition would account perhaps in part for the depression of the Barometer of the *Joven Corinna*, but we cannot go farther than to indicate these doubtful points in the absence of any evidence to prove them: I shall refer again to this singular phenomenon.

On the 11*th October*.—It is difficult also to assign any position for a centre, or even to affirm that any Cyclone existed in the Bay, for though we have the *Barham*, *Collingwood*, *Sea Park*, *Enigma*, *Ararat* and *Teak* dispersed over a sort of curved or hooked line of 4° of Longitude, and $2\frac{1}{2}$° of Latitude, there is nothing like Cyclone weather to be found in their logs, nor any thing approaching to a gale. The mere *winds* of the three nearest to any supposed centre, i. e. *Teak*, *Sea Park* and *Collingwood*, might indeed give us a spot about 90° East; 14° 50′ North, as a centre, but the *British Sovereign* must have been crossing near this spot on the 11th, and she carried the somewhat stormy, but not unusual, October S. W. monsoon with which she had run up from 7° North past it, and the *Sea Park* and *Collingwood* had both fine weather up to noon. Hence we cannot I think for this day at noon, by any sort of construction, allow that we have any data fairly

indicating that a Cyclone had commenced *at the surface of the ocean.* As before remarked, it might have been, and probably was, formed or coming up overhead. Towards the close of this day many of the ships began to have indubitable signs of its approach, or indeed I may rather perhaps say of its *descent.**

On the 12th of October.—If we examine the diagram which I have placed with the chart, in which the numbers signify the ships according to the table just given, and the little arrows their winds (though the force of these is not expressed), we shall see that on the N. Eastern quadrant of the Cyclone we have at noon the *Enigma* (3) and *Eagle* (4) with "strong gales" and "heavy gales" at E. S. E., while the *Teak* (2) nearer to the centre but in the same quadrant has "a furious gale with the sea one sheet of foam." On the opposite or S. W. quadrant we have the *Barham* (7) with thick weather and hard squalls, heaving too at noon, from the conviction that they were within the verge of a Cyclone, and that standing on, though the wind was fair, would plunge them into the centre; and the *British Sovereign* (20) with "a steady heavy gale" just allowing her to set the reefed foresail. She was, as remarked at the close of her log, probably a little farther to the Eastward.

On the North western and Northern quadrants we have a group of six vessels inward and outward bound, of which the first two, the *Ararat* (5), and *Washington Alston* (16), at the same distance from our centre as the *Barham* and *British Sovereign*, and both like them with strong and increasing gales.† The four others, *Asiatic* (10), *Edmondsbury* (14), *Futtle Rozack* (19), and *Charles Kerr* (21), had also heavy weather, and the Cyclone fairly set in with them, both from the fall of their Barometers, the strength of the wind and the unquestionable appearance of the weather. We have unfortunately no record of the weather on the Eastern quadrant.

We may thus take the diameter of the Cyclone for this day to have

* Adopting, only for the present, my own theory of these meteors, that they are formed above and descend as disks to the surface of the ocean, as a more convenient form of expression, and one which seems much more justified by the phænomena of the following day, than the word approach.

† They have both also the same apparent discrepancies in the directions of their wind-arrows, but this may arise from many causes, as 1. The wind carelessly marked—2. Ship's position uncertain—3. Incurving of the wind at the time.

been not quite 300 miles? or 150 miles of semi diameter on its advancing semicircle, for the *Sir Robert Seppings* (11), and *Framjee Cowasjee* (16) (this last with a pilot on board) had a heavy sea, squalls and threatening appearances, but did not make their preparations for bad weather till the afternoon: and if we refer again to the diagram we shall find that at the centre of the wind circles we have a space, marked by a double line, of 50 miles in breadth, within which are three ships, in a small right angled triangle, of which the greatest side is only 33 miles, with winds and weather at this time, as follows:

9. *Sea Park.*	Faint variable airs from the S. W. Bar. falling fast, birds, &c., taking refuge on the ship.
13. *Collingwood.*	Wind variable from the N. W. Barometer falling fast.
17. *John Hepburn.*	—Moderate and squally from the S. E.

Two of these vessels also, the *Hepburn* and *Collingwood*, sighted ships between daylight and noon under storm sail, and with top gallant masts down.*

It is evident then from these light opposing winds and dark gloomy weather, with other phœnomenon prevailing within this tract, while a gale and even a heavy gale was blowing around it, that these ships are within a broad central space, which I have marked for the centre of the Cyclone. I defer to the concluding remarks the strong evidence which this affords not only of the fact that Cyclones are, as I have already announced,† sometimes almost *Zonal*, when the proportions of the central to the storm portion are considered, but moreover of the fact that Cyclones are lifted up and *descend* again! I take the centre of the Cyclone then at noon this day to have been about in Lat. 17° 48′ N.; Long. 89° 18′ East. And we should remark also that its violence was not yet sufficient to dismast any of the vessels within its influence.

On the 13th October.—We have a diagram, which upon considering some of the wind-arrows, appears rather an anomalous one, but we have first to consider if the ships' positions are correctly laid down, and this

* Probably the *Victoria* and three other outward-bound vessels, the logs of which have not reached me.

† Journal Asiatic Society, Vol. XIV. p. 907.

no one can possibly answer for, although many are but just from sight of the land, or from the pilot, yet several are now two or three days without observations, in strong or severe gales, and some no doubt within the influence of the storm wave and current.

The nearest vessel to the centre at noon on this day was the *Ararat*, No. 5, which vessel had the centre passing her between 4h. and 6h. 45′ P. M., or say at 5 P. M.

At 1 P. M. the wind is marked as N. E. and her position is given by Acct. as in 19° 20′ North; Long. 88° 30′ East; but upon examining and working over her log I do not consider that sufficient allowance has been made for leeway and drift in such weather as she evidently had; the *gale*, being described in the log as "terrific" at 4 A. M. and the squalls "frightful" at noon, when no doubt they were close upon the centre. From these considerations then, and without any allowance for the storm wave, I have placed her at noon in 19° 31′ N.; Long. 88° 6′ East; and the centre close to her, as it was moving up from the S. Eastward, while she was drifting down across its track from the N. E.

The next to the *Ararat* is the *Sir Robert Seppings* (No. 11) also with the wind at N. E. of variable force, and veering to S. E. by 2, and S. S. E. by 5 P. M. and apparently most violent, at 7 P. M. when she had drifted close to the centre and lost her main and mizenmasts with other damage. The Cyclone passed close to her, but she did not, it seems, drift into its centre like the *Ararat*. Captain Stuart informs me that his position as estimated at 7 P. M. when at the height of the Cyclone, is he believes nearly correct, as he worked it with every allowance, both forward and backward.

We have then No. 14, the *Edmundsbury*. This ship was one of those which put to sea with her pilot on board, and must have been in much distress, for her ballast shifted in the Cyclone. As she experienced the calm and shift, her log and remarks are highly valuable, and I have calculated her position as nearly as possible. The *Camperdown*, No. 12, stood to sea from the pilot at noon of the 12th to the S. Eastward, but as the winds were barely at any time to the Northward of E. N. E. and mostly East, with a heavy lee current and sea and her leeway, she possibly may have been quite as much to the Westward as I have placed her, though not farther to the Southward at noon; although she seems by her log to have headed to the South till she reached the

calm centre at 7 P. M. having the shift at 7.30. She was probably at this time to the South of the parallel of 20°, and as the Cyclone was curving a little, we can see that its position and hers closely approximate, which is all we can expect with so many sources of uncertainty.

The *Framjee Cowasjee*, it will be noted, is upon the parallel of 20° North, and she was on the advancing (Western) verge of the centre at about 6 P. M. when she had the wind North, and moderating to a calm at 8, which would place her also to the South of 20° and close on the track of the centre, as I have marked it. No. 21, the *Charles Kerr*, offers some anomaly of wind, or of position rendered erroneous by the effect of the storm wave and storm current, which as she was for a considerable time with the wind at North, and hemmed in between the coast and the advancing Cyclone, where she would perhaps have had moreover some part of the Southerly current from Point Palmiras, it is not unfair to suppose that she was a little farther to the Southward and Eastward than she supposed, which will account then for her having the wind so far to the Westward. This ship was also in great distress, her pumps being choked by the sand ballast; the wind at 10 A. M. is marked W. N. W. and P. M. S. W. b. S. so that it veered 7 points in two or three hours! showing that the ship was close upon the centre, and all hands probably too anxiously engaged in freeing the ship, as they were reduced to baling, to pay much attention to the exact direction of the wind for which I have therefore given a curved arrow. No. 20, the *British Sovereign*, is also an anomaly, if we suppose the Cyclone to have extended so far, but this it could barely have done, and the log of the *Teak* shews that there was a strong Southerly monsoon following the Cyclone.

The *Teak*, No. 2, also presents a slight anomaly, but she had now been three days without an observation, so that her position is necessarily uncertain.

The wind and position of the *Asiatic*, No. 10, however, are at first sight the most difficult to account for, as her position must be tolerably correct since she had just stood off from the coast on the 11th, and though with the N. E. and Easterly gales and hurricane which she had, she appears to have made little more than a W. S. Westerly drift between the 12th and 13th, yet as regards her Southing she must at least have been at noon on the 13th as far to the South as she is

placed, though she may have been more to the Eastward. Yet we find she had the wind at noon blowing a hurricane from E. N. E. veering to North at 4 P. M., and to N. W. at 8, when it was "impossible to look to windward." It is very clear that this could not have been any part of the main Cyclone, and I am thus inclined to believe it to be a smaller one thrown off from the main vortex, as we have so frequently seen occurs, especially when near coasts; and it is the more certain that this occurred as we find that the centre of the Cyclone passed False Point at 10 P. M. of the 13th, while the *Asiatic* was 72 miles to the South of that spot, near the centre of an evident Cyclone, or tornado Cyclone, blowing a hurricane at E. N. E. at noon; veering as we have just described, the ship having evidently drifted round the centre on its Western or advancing side; and from the brief report from Ganjam, as well as from the veering of this Cyclone, we may see it was travelling up to the N. N. W. at least, if not on a more Northerly track.* The note we have from Ganjam, in Lat. 19° 22′. N.; or about on the parallel of the *Asiatic's* position, shews that the Cyclone can only have skirted the coast there.

I have therefore with all these views placed the centre of the principal Cyclone for this day in Lat. 19° 12′ N.; Long. 88° 13′ East; and assigned a small separate one to the *Asiatic.*

On the 14*th October* at noon, we have the *Camperdown* (No. 12) and *Collingwood* (No. 13) close in with False Point, the latter ship indeed at anchor to the Northward of it, and the *Edmundsbury* and *Framjee Cowasjee* about 25 miles to the Southward of it. The Cyclone with all these ships was moderating between 1 and 4 A. M. from the South to S. S. W. and S. W. according to their positions, and by noon it was nothing more than a gale rapidly decreasing.

DESCENT OF THE CYCLONE ON THE 12TH, AND ITS PROBABLE ORIGIN.

If the Cyclone existed *as* one, at the surface of the ocean on any day preceding the 12th, we should doubtless find some distinct traces of it. For though we have as early as the 9th, and for the 10th, and 11th, strong and heavy Southerly and S. S. Westerly breezes on the

* The whole veering (E. N. E. to West) would give a N. b. W. track for this little Cyclone.

Eastern side of the Bay, yet we find that all the ships towards the middle and on the Western side of the Bay are running up with strong Southerly and S. Westerly winds. Now if there was any Cyclone at this time we should have undoubtedly from so many ships some record of equally strong North Easterly, Northerly or North Westerly breezes but there is nothing of the kind.

As before remarked however, we have the puzzling fact of the numerous exhausted land birds which alighted on several of the ships (*Sea Park*, and *Barham*, on the 12th, and *Edmundsbury* and *Ararat* on the 13th) to account for, and if we allow that by any remote possibility those of the 13th might have been whirled into the vortex by a stream of wind at N. E. from the Sonderbunds,* yet those of the 12th certainly could not have been so; and the nearest land to the centre on that day is Cheduba, at 330 miles distance to the E. N. E. with the coast of Pegu to Point Negrais to the Eastward, and the Northern Andamans to the S. Eastward.

Hence referring to what has already been said p. 893 of the winds, and of the appearances of the weather at the centre, and the falling of the Barometers of the ships on the 11th, we seem justified in saying that in this instance the Cyclone actually *descended* on the 12th, after passing over some land, from which it carried up the Ringdoves, Snipes, Parrot, Butterflies, &c. and that judging from its track this was more probably the Andamans than the Coast of Pegu: the S. S. Westerly winds of the *Joven Corinna* being an evidence that for the 10th and 11th, the centre of any Cyclone must have been to the South Westward of the Preparis passage.

Having shewn that the Cyclone must have settled down in the Bay of Bengal after having previously passed over some land to pick up the birds and insects which it brought with it, we are naturally led to enquire where it originally came from, since the bad weather experienced by the *Enigma* in the Andaman Sea does not give us any evidence for its formation there.

From several logs which have been forwarded to me it appears that,

* They could not have been brought from the Cuttack coast, where the weather was moderate though threatening on the whole of the 12th.

† The average track is N. 41° West, and the average rate for the whole distance about 5′ per hour.

from the 7th of October, there was bad weather indicating the approach of a Cyclone in the N. Eastern part of the China Sea, apparently by the Straits of Formosa, which by the 9th, was a severe Cyclone, in which H. M. S. Childers was nearly lost on the Pratas Shoal. I make the centre of this Cyclone to have been on that day in Lat. 21° 15′ N.; Long. 117° 35′ East; and that on the following day it had travelled about 285′ to the W. b. S. Now from the position of this Cyclone in the China Sea on the 9th, as given above, to that of ours in the Bay of Bengal on the 12th in 17° 48′ N.; Long. 89° 81′ East, the course and distance is S. 83° W. 1530 miles, which in the 3 days gives 510 miles per day or 21 miles per hour.

If we then take this to have been the same Cyclone, it was one which when raging at the surface of the Ocean in the China Sea travelled about at the rate of 12 miles per hour, as by the logs of it which I have; then for three days at 21 miles per hour in the atmosphere; and then after re-descending, at an average rate of 5 miles per hour in the Bay of Bengal, and in the course of its aerial track altering its route from W. $\frac{3}{4}$ S. to N. 41° West. In the change or curving of the track there is nothing remarkable, as we have numerous instances of this, but it seems a somewhat forced conclusion to assume at pleasure these different rates of 12, 21 and 5 miles per hour for the purpose of accounting for a supposed connection between these Cyclones. We can then only note all the data as above, and affirm that our Cyclone certainly descended in the Bay of Bengal, after passing over, or being formed upon some land from which it brought the birds and insects.

RATE OF TRAVELLING.

The course and distance between the centre of the 12th and 13th is N. 37° West 90 miles only, giving a rate of not quite 4 miles per hour. From the centre at noon of the 13th to False Point is N. 47° West,† a little more than the same distance, which it passed over between noon and 11 P. M., so that we may thus fairly set down its average rate for this interval of time, as 8 miles per hour, and this phœnomenon of the Cyclone's augmenting its velocity as it approaches the shore is well worthy of note, as in this case it was approaching a low shore with the broad valley of the Mahanuddy river inland. If we compare on our Diagram No. 4, the run of the *Collingwood*, overrunning the Cyclone, with

that of the *Futtle Rozack* clearing it, we shall be satisfied that this augmentation of velocity took place, and moreover, as the *Collingwood's* log may be quite depended upon, we may be assured also that our estimate of the track, if not mathematically true, is so near to the truth that none of the main facts can be doubted.

Part III.

Remarks.

Under this head I propose to set down first, short disquisitions on many points of great interest which have been elucidated in this Cyclone, then to give a table of the ships, with remarks on their management or errors, and finally to deduce, so far as we can safely do so, some practical rules for ships approaching or leaving our dangerous Sandheads at the Cyclone seasons.

Signs of the approaching Cyclone.

Leaving out the swell, which at the head of the Bay at least may be considered an equivocal indication, as the varying monsoons and the heavy discharges of 200 miles of the channels forming the mouths of the two great rivers, the Hooghly and the Burampooter, must often affect it, we come next to,—

The Banks of Clouds.

These are very distinctly noted in the logs of the *Wellesley*, *John Hepburn* and *Futtle Rozack* on the approaches of the Cyclone, and are noted by others on its leaving them. They were no doubt seen by more of the ships, though not registered at the time. There can be no sort of question however, now, that Cyclones *are* frequently so seen,* and they will be oftener noted when sailors learn what, in conjunction with other signs, they may indicate. At present unless a peculiarly

* A recent and a very remarkable instance has occurred to myself. During the Chittagong Cyclone of May, 1849. I distinctly saw and watched for two days from the terrace of my house in Calcutta, say at a height of 50 feet, or of a ship's maintop, the bank of clouds moving from N. E. to S. E. and I was satisfied, from this and other signs, together with the barometrical indications that it was a Cyclone moving down from the N. E. corner of the Bay to the S. W. as it proved to be. Chittagong is 220 miles W. ½ S. of Calcutta, and had I been at the time in command of a ship bound to the Southward I should thus have had ample time to make all snug, and to consider beforehand what my best plan of management would have been.

remarkable and threatening cloud or bank appears, it is thought little of, and never noted in the log. We should bear in mind too that the same bank of clouds may look most dismal and alarming with the sun and ship in certain positions, while in others it may appear comparatively trifling, and *only* a bank of clouds. The question for the intelligent Mariner should always be, "*is* there a bank of clouds in addition to the other signs?"

The *Wellesley, Barham, Futtle Rozack* and other ships notice the "dark lurid appearance and the clouds flying in broken masses and thin sheets as if torn from some other mass." This I also noticed at the time of the Chittagong hurricane referred to in the preceding note.

2. *The Red Sky and Red Light.*—We have fortunately obtained in this instance complete proof, of the most convincing kind, that the red sky and red light occur at times in the Bay of Bengal as a distinct and remarkable appearance on the approach of a Cyclone. I have been unwilling to separate the details of each log as given to me by the Commanders, and thus refer the reader to the *Barham's* at p. 835, the *Wellesley* at p. 837, the *Sea Park* at p. 838, the *Futtle Rozack* at p. 854, and the *British Sovereign* at p. 840, which ship appears only to have seen a red glow at times.

The evidence, however, of the other ships is fully conclusive, and I have moreover the testimony of one of the oldest commanders to this port, Capt. McLeod of the ship *John McVicar*, as to a very remarkable Cyclone, that of the *London*, Capt. Wimble, in October, 1832, quoted by Col. Reid in his Law of Storms, in which it was distinctly seen in Lat. 15° N.; Long. 89½° East; *and also at night!* lasting from sunset till nearly midnight, the sky, and sea, and every object being of a bright scarlet colour!*

3. *Peculiar brightness and twinkling of the Stars.*—This precursory sign was also very clearly observed and noted by the *British Sovereign* p. 840, the *Chas Kerr*, p. 842, the *Sir Robert Seppings*, p. 844, and *Futtle Rozack* p. I remarked it also very notably at the time of the Chittagong Cyclone before adverted to, as also that the stars were visible at very small altitudes, and I have no doubt that had the sea horizon been visible from Calcutta, it would also have been very

* I shall in another place give the detailed statement sent me by Capt. McLeod.

distinct, as remarked by Capt. Shire in the China Sea, *(Journ. Vol.* XVIII. p. 49.)

4. *Peculiar Lightning.*—This is also noted in the log and remarks of the *Barham,* pp. 835, 837, and corroborates what we before knew of this peculiar Aurora Borealis or flashing kind of lightning. This appearance is not mentioned by any of the other ships, and it is singular to remark that while some vessels in the Cyclone had no lightning, or but very little, others had very severe thunder and lightning. It would appear that there may be certain zones or quarters of the Cyclone in which alone the electrical discharges occur, so far we can at present judge. Like many other matters, this requires to be better observed before we affirm any thing positively on the subject. I have collected in another section the evidence we have now obtained on this curious point.

Vibration of the Barometer.—This remarkable sign we find very carefully noted in the log of the *Barham*; and in that of the *Sea Park,* that the Barometer and Simpiesometer were falling at the time the daily rise should take place.

So far then as relates to the precursory signs of these meteors, we have collected here, from the observations in a single Cyclone, a great number of them, quite sufficient indeed to warn the attentive mariner of what may be at least passing near to him, if not approaching his position, and thence to give him frequently much more time for his preparations,—and time is often with him a question of masts or dismasting—or even of life and death!

Of Phænomena during the Cyclone.

*Dimensions of the Cyclone and its unequal extent in van and rear.**

I have already discussed at p. 897, the reasons which induce me to believe that this was a distinct instance of a Cyclone settling down in the middle of the Bay, perhaps after it had been raging in the China Sea, and certainly after it had picked up hundreds of land birds and thousands of insects from some land which it had passed over, and I

* This word *rear* may sound more military than nautical to merchants, and even to some naval-bred seamen of modern days; but as we have the van, centre, and rear of a fleet, we may with propriety use these words for the artificial divisions of "our enemy," the Cyclone.

now propose to remark on the limited and *unequal* extent to which we can trace it distinctly *as* a Cyclone.

I have given with the chart two diagrams, Nos. I. and II., of the ships in their positions at noon on the 12th and 13th, with their wind-arrows and the Cyclone circles correctly marked; as also one, No. III. of a supposed section of the following, or rear, half of the Cyclone in the line of the track which will be subsequently explained. Taking the first of these diagrams, that of the 12th, we find the utmost extent which we can fairly allow it to have reached, as a Cyclone, at noon on that day to the S. Eastward, or on the line of its track, is to the circle marked a little without the positions of the *Barham*, No. 7, and *British Sovereign*, No. 20, or about 90 miles of radius, or 180 miles of diameter. Had it extended farther in this direction these ships, the commanders of which were most fully prepared and anxiously watching for it, would have been hove too sooner, as they were running up towards it at the rate of 8 and 9 knots an hour. But we see, also, that in front, on the line of its future track, the Cyclone circles distinctly extend to Nos. 10, 14, 21 and 19 or even to Nos. 15 and 11, the four first of which ships had the Cyclone fully commenced with them, while the two last were certainly on the verge of it, and this would give its semi-diameter an extent of 140 miles iu front, or 280 of diameter, against 90 in the opposite direction or 180 of diameter. At right angles to the track we have No. 8, evidently without the Cyclone circles, though just approaching to them. We canuot also on this day allow that it reached the Pilot or Light Vessels, but they had evident indications of it, and while No. 15, the *Framjee Cowasjee*, at 170 miles N. N. W. of the centre has a strong and increasing gale from E. b. N. and E. N. E. No. 18, the *Easurain* at 190 miles to the W. S. W. or at right angles to the track (she is not included in the diagram) has a fine N. W. breeze and fine weather, moderating nearly to a calm iu the afternoon.

On the 13th again, we perceive by the diagram No. II. that while the monsoon is evidently following up the Cyclone with Nos. 7, 9, 2 and 17, so that we cannot to the S. Eastward allow its semi-diameter to be more than 65 miles, or 130 of diameter in all; we find that to the North Westward we may without any exaggeration extend the circles, as marked, to the Light Vessel and False Point Palmiras, or to 115 miles, giving a diameter of 230 miles, or about in the same proportion as that

of the 12th. For the extent of the Cyclone on the 14th, as it had then reached the land we have not any data.

We may then take it that we have here tolerably distinct evidence that though the form of the Cyclone was circular, the continuations of these circles were wanting on the following side of the storm disk, and hence we arrive at a solution of the undoubted fact that the latter half of a Cyclone, as calculated from the passage of the centre, seems always to be of shorter duration than the advancing or front portion of it. I have already (Sailor's Horn Book,) suggested that this may arise from the disk's not being truly tangential to the earth's surface, but slightly lifted up behind, from the friction of the advancing part against the surface of the ocean retarding its progress.* Now assuming that a disk is one of 150 miles in diameter and of 5 miles in thickness, we can easily calculate that while the whole 75 miles of the van or advancing portion, if it was moving at the rate of 6 miles an hour, would take $12\frac{1}{2}$ hours to pass over the ship, a slight inclination of the disk might elevate the following or rear half of it sufficiently to leave say 20 or 30 miles of that part free from its surface action; for an elevation of one mile will, if the whole is projected to scale, be seen to give but a very slight curving upwards to the last 20 or 30 miles of the following side of the disk, so that in such a case the centre of the Cyclone would have 75 miles of the storm disk and its tolerably regular circular winds before it, and only 45 miles behind it; or it would appear to be situated eccentrically on the chart if it was projected according to the winds reported; and if a strong monsoon or trade was blowing behind it this would soon follow and occupy the vacant space between the disk and the earth's surface with its own wind. It is evident that if we multiply the supposed size of our disk, say by 5 or 10, making it 750 or 1500 miles in diameter, and double or treble its velocity, or suppose it to move at the rate of fifteen miles per hour, we shall have a storm disk, which, truly projected on a chart by the logs of the ships, will extend in the same proportions to 375 or 750 miles on its van or advancing portion, and to only 225 or 450 on its following or rear part, and be consequently of so many hours less duration to the ships it may meet with.

* I am not sure that this suggestion was originally my own, and have some reminiscence that it is Mr. Redfield's, or Sir J. Herschell's, but cannot find the reference.

I have given in diagram No. III. the true projection of a section of the following, or rear, half of a Cyclone of 150 miles in diameter, on the line of its track, both horizontally and vertically, to a scale of 10 miles to one inch, to shew the lifting up clearly; in which the disk on that side is shewn as having lifted itself two miles above the surface of the ocean, and is thus giving to the ships involved in it 75 miles of its fury in front, and but 50 miles in its rear portion; or to express this in Time; it is a Cyclone which, if it was moving at the rate of 10 miles per hour would last $7\frac{1}{2}$ hours in its onset, till the calm reached, and but 5 hours in its decline. If we take our diagram to represent the following or rear half of a Cyclone of 300 miles in diameter, or double its scale,* as marked on the second line of figures below, we can understand at once how the lifting up of the following part of the disk would much diminish the extent and duration of the Cyclone to the little ships marked upon the diagram, say to 10 hours of time, while those in the advancing circles would have the whole extent of the semi-Cyclone in that direction passing over them, which would require 15 hours.

Cyclone seen through, at its centre.

As connected with its extent we may remark here also upon its height, or more properly thickness, which appears to have been very insignificant, perhaps not more than a mile or two, for it will be observed that while the *Edmundsbury* had it at the calm centre "much lighter overhead," Mr. Brackly at the False Point Light House had "the rain clearing off and saw the stars very clear overhead, but a thick bank of haze all round," so that it appears to have become thinner as it approached the land? The *Camperdown* also from 7h. to 7h. 30′. P. M. in the calm had it "fine overhead."

Hot and Cold blasts, Hail, &c. during the Cyclone.

Capt. Arrow of the *Wellesley*, it will be seen, noted this phænomenon of alternate hot and cold blasts, comparing the first to the Scirocco. The *Charles Kerr* and *Futtle Rozack* also experienced, if not hail, sleet. These indications are of some importance, inasmuch as hail

* For the sake of the even numbers: We have 280 miles for the diameter of our present Cyclone, as measured by the advancing circles on the 12th, and 230 on the 13th.

is generally considered to be an electrical phænomenon, and whether it be as a cause or an effect, every electric indication is of importance.

The Storm Wave and Storm Current, and the set over the Sandheads, before and during the Cyclone.

Taking the storm wave as our first subject of consideration, we find it very clearly described to me by Mr. Brackly, (which I have substituted for his official report from False Point,) p. 849, in terms which leave no manner of doubt that it was a peculiar effect of the Cyclone, and this is more unquestionably shewn when we advert to the time of tide at which it occurred. Had it occurred with the inset of the flood we might have allowed it to have been a tidal bore so common in our Indian rivers.

The fact that it occurred about three hours after the passage of the centre of the calm is at present difficult to account for. We can only note it at present as an apparent anomaly, to be compared with other correct accounts when we obtain them.

But of the storm currents in the Bay, and especially of that setting over the Sandheads, we have abundant proof for all practical purposes, and we can in fact trace it more or less from the middle of the Bay up to the Sandheads, then across them and again to the Southward, as we shall now show from the different ships' logs and Pilots' reports.

The *Sea Park*, which ship hove too, soon after the centre passed her, on the eastern side of the Cyclone, with the wind South, notes from the 12th at 4 P. M. to the 14th at noon, a set of 80 miles to the Northward. This was between Lat. 18° and 19° $\frac{1}{4}$ N.

Captain Plum, of the *John Hepburn*, states that he experienced a strong current to the Northward; this was between $17\frac{1}{2}$ and $19\frac{1}{2}$ N.

But as these two vessels were hove too it might be fairly supposed by strangers that they had under-estimated their drift, but we have the log of the *Collingwood*, which ship was running up with the Cyclone close on its S. Eastern quadrant, and though for a considerable time within the Southerly current off Point Palmiras, yet she has an excess of 31 miles by account to the North of her supposed position in 24 hours, partly no doubt from the storm wave, and partly from the storm current.*

* I am enabled to add here from an independent but very trustworthy source, a remarkable instance of the storm current, in the case of the ship *Albion*, Captain

Off the Sandheads we have the log of the *Camperdown*, which ship, even on the 10th, found a strong S. W. current of 3 miles per hour running, with several of the Pilots' reports, though this current is so well known to them at the approach of a Cyclone that they rarely notice it, and as already stated on a trial in the Pilot's Court, which arose out of circumstances occurring at the onset of this Cyclone, it was sworn to by several experienced witnesses, of long standing, that the Westerly current was in their judgment running from 3 to 4 knots per hour, which is independent of the tide. So that if we take $2\frac{1}{2}$ knots per hour it will not be an excessive average for this current in the parallel of the outer Light Vessel, or 21° 4′ N.

On the coast we have only the log of the *Sir Robert Seppings*, marking distinctly the Southerly set on the 11th of 2 miles per hour, but it is not necessary to repeat here what I have elsewhere said of the sweep of the current round the shores of Balasore Bay, and past Point Palmiras.

Barometer as measuring the distance of the Centre.

Having the places of the centre of the Cyclone pretty correctly marked for the 12th and 13th, I at first anticipated that this Cyclone might afford us some tests to know if the rule laid down by me for ascertaining the distance of the centre of the Cyclone by the rate of fall of the Barometer per hour, would give correct results with one which, as to extent, we call a small, and as to rate of motion a slow-moving Cyclone. Unfortunately, so far as our present knowledge extends, we have no rule within 150 miles of the centre; and our Cyclone does not fairly in any case reach to this extent of semi-diameter except towards the land where the Barometrical indications seem always affected by it for some distance, if the land be not very low. Hence from

McLeod, one of the oldest commanders in the trade between Calcutta and England, who in a Cyclone in October, 1832, (the *London's* Cyclone) ran up from about $15\frac{1}{2}$ North, on the meridian of about $89\frac{1}{2}$ East, on the Eastern verge of a Cyclone with "a terrific hurricane" about South; and when preparing to heave to at a safe distance, as they supposed, from the Sandheads, found themselves in $8\frac{1}{2}$ fathoms on the tails of the Sunderbund reefs, but fortunately beat off. With every allowance Captain McLeod finds that they certainly overran the log about 70 miles in 30 hours!

these two causes I have found that, though with some of the ships the rule would give tolerable results, yet with most it would place the centre very much farther off than it really was ; it being thus, as before announced, difficult if not impossible to judge of the distance of the centre at less than 100 to 120 miles by the rate of fall.

Diagram, No. IV.

This diagram requires a brief notice. It is one on a scale double that of the chart, of the tracks of the ship *Collingwood* running up on the Eastern and North-Eastern quadrants of the Cyclone, and in fact overrunning it on to a lee shore! and losing her masts in doing so ; and of the *Futtle Rozack* crossing in front and making a fair wind of it, while it was dismasting the *Washington Alston*, *Hope* and other vessels which left their pilots with her, or about the same time. On the difference between the management of these ships it is not necessary to remark.

The Barometers of both are marked at intervals of their track, and shew how correctly they measure the approach to, or recession from the centre, though not the actual distance from it. These two ships it will be seen were passing each other at about 75 miles distance, and on opposite sides of the Cyclone, both carrying what sail they could shew, but at midnight 12th and 13th, the *Collingwood*, a first rate English ship, with troops on board, was running in full career into the very jaws of destruction, and the *Futtle Rozack*, a deeply laden rice ship, and a poor sea boat, with a new lascar crew, making her way, as surely as scientifically, into fine weather, without straining a rope yarn.

The Lightning experienced in various parts of the Cyclone circles.

It seemed of interest to know if we could in this Cyclone deduce any views from the knowledge of this question. I find that exclusive of the distant lightnings before the onset of the Cyclone, the different ships noticed it within the Cyclone circles as follows :—

Burham (7).—At midnight 13th, "much vivid lightning," but during the strength of the Cyclone very little lightning; not more than 3 or 4 flashes altogether, wind about South.

Wellesley (8).—On 12th, 8 P. M. to 2 A. M. 13th vivid lightning and peals of thunder, all round and close over the ship, wind West to S. W.

British Sovereign (20).—At 10 p. m. 12th, vivid flashes of lightning and heavy thunder to 2 a. m. of 13th, apparently very close. Wind S. W.

Edmundsbury (14).—No lightning at any time.

False Point Light House.—No lightning while blowing, but during the calm some forked lightning from N. Westward going to the S. Eastward.

John Hepburn.—Neither thunder nor lightning.

Futtle Rozack (19).—9 p. m. midnight 12th, much summer looking lightning from S. E. to West; and at 10 p. m. 13th, heavy squalls with dreadful thunder and lightning; at midnight moderating fast, wind West to S. W. I made enquiries of most of the Commanders who sent me their logs, but received for reply that there was no lightning or "little to speak of," so that if there had been any of any severity we may suppose we shall have had it noted. All that we derive from this brief summary then is, that a few ships on the South and S. Eastern quadrants of the Cyclone where it was lifting up as we suppose,* experienced heavy electrical discharges. We must wait for farther knowledge on this question.

Part IV.

Table of the ships with remarks on their management.

1. *Brig Teak*—Should have hove to at midnight of the 11th, or by 8 a. m. of 12th till her Barometer rose again.

2. *Joven Corinna*—Was perfectly correct in standing to the Eastward, as the Southerly wind shewed that she was on the Eastern verge of the Cyclone, if there was one.

3. *Enigma*—Ran too close in between the 12th and 13th; she might, if the Cyclone had been travelling up to the N. b. W. or N. N. W. have placed herself, possibly when disabled, between the Cyclone and the lee-shore of the Sandheads of the Sunderbunds; and this uselessly, as she could not have obtained a Pilot or run in with such weather. In other respects she kept safely on the N. E. quadrant of the Cyclone.

4. *Eagle*—Hove too on the right tack and properly allowed the Cyclone to pass her. A stout merchantman or man of war might

* The analogy of this to the condensing disk of the electrician is obvious, but we want more evidence before we reason upon it.

have carried sail to the N. E. or N. N. E. and soon found finer weather, but a small schooner could do nothing better.

5. *Ararat*—Chased aud ran into the centre, though being evidently a good sea boat, and well handled, she escaped unscathed as to masts. though of course straining her hull greatly. She should have hove too at least by 6 A. M. on the 12th, for there could then be no sort of doubt of a Cyclone, and it is quite useless, if not dangerous, to get close in with Point Palmiras or the Pilot station in such weather.

6. *Flora Macdonald*—Like the *Eagle*, was hove to on the right tack, and could do no better, being close in to the Eastern shore.

7. *Barham*—Perfectly well managed, heaving too at the right time and in the right place, and did not strain a rope yarn!

8. *Wellesley*—The same masterly management as the *Burham*.

9. *Sea Park*—The same. She was *at* the centre when it settled down, and though as it passed on it gave her, being on the Eastern side a Southerly gale, yet she very properly hove to till it was safe and proper to run on, so as to come into soundings in moderate weather.

10. *Asiatic*—Had the wind at N. E. at noon with every indication of a Cyclone to the S. E. of her, and the known tracks being almost invariably from that quarter. If like the *Futtle Rozack*, close to which ship she was, she had run to the S. S. W. and hauled gradually up, so as to run round the heel of the Cyclone, she might have escaped the severe part of her smaller Cyclone, and the risk of beiug dismasted while drifting on a leeshore.

11. *Sir Robert Seppings*—This ship's Barometer, standing high, the frequent treacherous moderating of the wind, and perhaps the desire to obtaiu a farther offing, led her to stand to the Eastward till she placed herself exactly on the track of the centre. She should have bore up to the South between 10 P. M. and midnight of the 12th, and have run round "under the stern" of the Cyclone, wheu she would have recovered her Northerly position, unscathed, by about the time at which she was dismasted!

12. *Camperdown.*—At noon of the 12th, was standing to sea being 15 miles S. S. W. from the Pilot vessel. Her case and the course she should have adopted is exactly that which will be supposed in the next section, but with the difference that she had far more time and room to run down and cross before the Cyclone, since it was 19½ hours before the centre reached her.

13. *Collingwood*—This vessel's management in contrast with that of the *Futtle Rozack* has already been examined. It is evident that her rapidly falling Barometer from noon 12th, and S. E. b. S. gale; at 10 P. M. were indications of a Cyclone to the S. W. of her, which according to the known tracks would be travelling up between North and West or N. West, and that her safe course was to haul out for a few hours to the N. Eastward before the sea was too heavy and till her Barometer rose, and then heave too on the starboard tack, so as to have had the gale always drawing aft, a clear drift, and the pilot station well open to her, whether the Cyclone was to be followed by Southerly or by N. Easterly winds.

14. *Edmundsbury*—The Pilot stood to sea at 6.30 P. M. on the 11th, he had consequently abundant time to cross in front of the Cyclone, if he had known or could have ventured to have adopted this plan, which I shall shew at the conclusion of this memoir is almost always the safe one, and that moreover no distance or time is really lost by it.

15. *Framjee Cowasjee*—The error of the Pilot on this vessel is exactly that of the *Edmundsbury*. Fifty miles to the S. W. would have saved her masts, and have given her a N. Westerly and S. Westerly gale, to cross in the wake of the Cyclone and run in again in the fine weather, without straining a rope yarn.

16. *Washington Alston*—A. M. the same error of standing to the S. Eastward, and the same dismal penalty paid for it, in loss of masts straining of hull, damage of cargo, and a long tedious drift *of thirty seven days!* about the Bay, in light winds and calms, in a disabled state before she could get in agaiu.

17. *John Hepburn*—This little vessel was bound to the Eastward and was one of those caught by the descent of the Cyclone in its central space about noon of the 12th. She had the warning of her Barometer falling on the 11th to 29.50 and A. M. of the 12th to 29.38; but up to nearly noon of the 12th when the Barometer had fallen to 29.25 and the Cyclone by passing on had given her its S. E. gale with which she was drifting till the 13th, when it gradually left her, she had no wind to indicate to her whereabouts the centre might lie, and in the S. E. gale a small vessel could not risk standing off to the N. Eastward.

18. *Easurain*—Had passed well to the Southward before the Cyclone settled down.

The Ship Forth was capitally well managed, though from compulsion of circumstances and not by design; she was ordered to sea from the Pilot and spoke the *Camperdown*, and being leaky and unmanageable kept before the wind, ran round the Cyclone, being at one time very close on the centre, and was in a good position for coming in again to repair when the weather moderated!

The *Futtay Allum* evidently ran into the Cyclone on its Western and S. Western quadrant till near the centre, when its violence obliged her to heave to, and she seems to have drifted up with the S. Easterly hurricane, and with the storm wave and current, into soundings, disabled and partially dismasted.

19. *Futtle Rozack*—I have already quoted the admirable management of this ship.

20. *British Sovereign*—Like the *Barham* and *Wellesley* was excellently managed, heaving to at the proper time and place, and escaping all damage.

21. *Charles Kerr.*—This ship necessarily stood off to get an offing, but when she had done so, at noon on the 12th, she should have put her helm up and run to the S. W., till the N. Westerly gale of the S. W. quadrant of the Cyclone, and her rising Barometer, shewed her it was safe to haul round the heel of the Cyclone, or time to heave to avoid running up again too early.

The statistics of this Fleet, for such it was, may be well worth summing up. We find, then, that we have in the twenty-two vessels, the *Easurain* having altogether passed over the Cyclone tract before it descended, the vessels as follows:

At a distance from the Cyclone but well managed in anticipation of it,	2
Ran in too far before heaving to,	2
Suffered more or less but unavoidably so,	1
Running into, or with the Cyclone, or lying to in the way of it, but escaping with only severe straining,	5
Dismasted by running, or standing into, or chasing the Cyclone,	5
Perfectly well managed by their knowledge of the Law of Storms,	6
Well managed from necessity,	1
	22

We have to add to this that seven ships and brigs, exclusive of coasting craft are known to have foundered, whether from mismanagement or bad condition, or under unavoidable circumstances, we cannot say, and that the ships *Collingwood*, *Camperdown* and *Sea Park* had on board 733 men, 11 officers, 46 women and 41 children; altogether 831 souls; of H. M. troops, which we may fairly call a whole regiment; two thirds of which, i. e. those on board of *Collingwood* and *Camperdown* were exposed for a time to imminent risk. There surely wants nothing more than this to convince the most incredulous of the deep importance of our science to both public and private interests?

Part V.

Practical deductions for the Management of inward and outward bound ships, at or nearing the Sandheads, when a Cyclone is approaching.

The great objects of all these researches are, first to develop the laws by which Cyclones are governed, and then from such laws to deduce rules for every special class of cases whereby life and property may be rendered more secure. In no part of the ocean are such rules more required than at the difficult access to the mouth of the Hooghly; and in no part, as far as I recollect, is there to be found a more perplexing combination of dangers at the approach of a Cyclone. I have long contemplated the task of unravelling this complicated network of perils, but I have felt, hitherto, that our data were too insufficient to enable me to speak with confidence on many essential points, and to illustrate what I might say with undoubted and striking examples. In a word, if I may be excused the phrase, "*we wanted a good Cyclone with plenty of ships involved in it to give us some clear and startling lessons*," and I trust, now that we have had one, the foregoing pages will prove that I have done my best to turn to account the materials which have been so liberally furnished, and that I shall not be found to have set down these rules without duly weighing the heavy responsibility of doing so.

Let us consider what are the various dangers in a Cyclone to a ship at (within) or near the Sandheads where they invariably commence from between N. N. E. to N. E., East or S. E.

1. The sands forming a lee shore from the Western Brace to the mouth of the Burampooter, with narrow channels and indifferent holding ground, and a sea in which no ship can hope to ride with safety in a severe gale.

2. The land to the Northward and Westward, and from Point Palmiras to the Southward.

3. The heavy set to the Westward over the sands, and for some distance outside of the tails of the reefs.

4. The Cyclone itself, with its uncertain track, and its attendant storm-wave and storm-current, one or sometimes both, setting on to the sands or to the coast about Point Palmiras.

It is evident that in every Cyclone these four conditions must be all taken into account; and as there is now no sort of doubt about their rotation, the usual tracks of the Cyclones become the next consideration, for it is upon the track of the Cyclone and its rate of travelling that the safe application of any rule must mainly depend. From all our investigations up to the present day it appear, that at the Sandheads, and from thence to 8° or 9° North, the tracks of the Cyclones may lie from between E. by N. and S. by E., or S. S. E., to the W. by S. or N. by W. or N. N. W., and as will be seen by the Chart of tracks in the Horn Book that the average may be about from the S. E. or S. E. by S., to the N. W. We can only lay down rules from the average, noting where they would be affected by any great deviation towards the extremes.

The rate of travelling is the next consideration, and this too varies very much, though it probably seldom exceeds ten miles per hour, which we shall also assume as an average.

Taking, first, the inward-bound ships, whether from Madras, from Europe, or from the Eastward, we have to consider their position, and then if the Cyclone is ahead, or astern, or abreast of them, and in what part of the Bay its centre may be, for it is clear that all these cases will vary as this element also may vary.

The first case in which the Cyclone is ahead of the vessel, or in other words the ship is behind the Cyclone, is simple enough: when convinced of its being a Cyclone, the rule should indubitably be to heave to, and this on two accounts; the first to avoid running across, or into the centre, or overtaking it, and the second because, even if a

vessel got safe through, or past, the centre, she would not gain an hour of time on her voyage, since, as we see in many of the foregoing logs, she would on reaching the Pilot Station be ordered to sea, or if the Pilot Vessel had been blown off the station the stranger might find herself hampered off the Reefs or Braces, with 24 hours of heavy weather yet to go through, on a lee shore; the Cyclones always ending at South, or S. W.

The case in which the ship is *abreast* of the Cyclone, which we may describe as having the wind North or South blowing a gale, with a falling Barometer, so that the centre bears East or West of her, is a double one. If the wind is South or between S. E. and S. W. it is clear that the ship is also safely to the Eastward of the Cyclone, and has only to heave to, if she has not a long run to make to the Sandheads. She will of course heave to on the starboard tack, being on the right hand side, till her Barometer rises; or if it be judged, say by the violence of the S. E. squalls and the fall of the Barometer, that the centre will yet pass close to her, to stand off to the N. E., unless indeed the vessel be altogether hampered in the N. E. corner of the Bay.*

If however, she has the wind between N. E. and North, it is clear that the Cyclone is to the Eastward or S. Eastward of the ship, and is perhaps coming direct towards her at the rate of ten knots an hour, and she must now run back to cross in front of it; always remembering that every mile she runs, say to the S. S. W., after she has brought the wind N. N. E., is into safety, as her rising Barometer will quickly show. The reason for this is obvious; she avoids the centre and avoids the farther danger of being hampered, with perhaps a disabled ship, between the Cyclone and the heads of the reefs or the coast of Orissa, as may be. She may always, as she brings the wind to the Westward of North, haul to the Eastward and *run round* the Southern quadrants and "under the heel" of the Cyclone, so as really to lose no time while running easily before it,† or with a quartering gale, so as to avoid the racking and straining of heaving to, or of carrying sail off a lee shore or riding it out when dismasted.

For the outward-bound ships it is clear that, supposing them to leave

* I always assume sea room as this is necessarily the sailor's first consideration.

† As in the case of the *Forth*, just quoted, which though a forced manœuvre, was successful, and shows what may be done by a ship which steers well though in distress.

the Pilot at the commencement of the Cyclone, or to meet with its onset a few hours after getting to sea, say in 20° North, their rule must also be the same, namely, to bear up so far as to cross in front of it, and not, which has usually been done, to stand close hauled into the very path of the track.* And recollecting that from False Point the coast trends to the Westward of S. W., and that in 20° North on the meridian of the Light Vessel, a ship is still 120 miles from the Black Pagoda, there need be no fear about making a little Westing at first, for allowing the Cyclone the very worst track we can suppose for a ship in this position, namely, one from S. by E. it is clear that a very short run to the S. W. will place the vessel at a distance from the line of the track and bring the wind to N. N. E. and gradually to North, so as to place her abreast of the centre; and if the track is from any point more Easterly, as it probably will be, say from S. E. or E. S. E., then the distance to be made will be but short to a Northerly wind. The intelligent mariner may easily by means of a storm card see the truth of these propositions.

For the set over the Sandheads it may be safe to allow three and a half miles an hour at the onset of a Cyclone, *at the Light Vessel*, decreasing to two and even one knot by the time the vessel has passed the parallel of 20°; but also increasing both in breadth and velocity if the Cyclone has lasted any time, and the careful mariner will duly take this into his account, whether standing out or hove too.

We may further illustrate this by a reference to our Diagram, No. I., upon which we will suppose, to put things almost at the worst, a Cyclone like this of October, with its centre on the position marked for that of the 12th in Lat. 17° 48' North, Long. 89° 18' East, coming up on the same track towards False Point, but at the rate of *ten* miles an hour. This will place it in twelve hours about 20 miles ahead of the spot at which the centre of the 13th is marked, or say in Lat. 19° 17' North, Long. 88° 18' East, and leaves still a distance of something more than 80 miles between its centre at midnight and False Point. Now, though ships would probably be ordered to sea, say by the station vessel (lying outside of the Light Vessel) on the 11th, and certainly at daylight on the 12th, we will suppose a vessel so belated, or to have mistakenly run in so far, that she can only start from

* No doubt to make Southing and to get an offing from Point Palmiras.

the Light Vessel at noon of the 12th, so as to get 100 miles of run before midnight. It will be seen by taking this in the compasses that steering to the S. S. W. and S. W. by S. it will take her between the Point and the centre, and at a distance of 45 or 50 miles from this last, and then enable her to bear away to the S. W., so that she will quickly run into the moderate weather, and can gradually haul up to the Southward, Eastward, and Northward back to the Light Vessel again, if the weather is fine enough. Every seaman will of course see that this is a question of rate of sailing, and above all of steering so as to avoid broaching to; but that even if he should be disabled (which he might equally be in lying to) he will still here have Northerly winds and a clear drift to sea, while on the Northern side of the Cyclone track he would be drifting on to a lee shore with Easterly and S. Easterly winds. The examples of the *Forth*, which vessel I take to have been at one time within 20 or 30 miles of the centre, and of the *Collingwood* while overrunning the Cyclone, are instances of what may be done by good steering ships even in the very height of these fearful tempests and close to the centre, and the *Fattle Rozack's* management is a good instance of passing a Cyclone at a reasonable distance with a heavy sailing ship.

In some instances, as in the Coringa Cyclone of Nov. 1839, which forms the subject of Part II. of my second memoir (Journal Asiatic Society, Volume IX.) it has occurred that a Cyclone travelling from the Andamans to Coringa was so far felt as a heavy Easterly and *E. S. Easterly* gale at the Sandheads, that for some days it was imprudent to approach the station, and all vessels were warned to sea. But in this and all similar cases of distant Cyclones the Barometer is the guiding indication, and in this instance the Barometer was at 29· 92' to 29· 95' at the Light Vessel.

In my third memoir, also (Journal Asiatic Society, Volume IX.,) we have an instance which might appear to create a difficulty, *i. e.* a Cyclone travelling across the Bay from the Andamans, first towards the Coromandel Coast, on about a N. W. by W. course, or towards that part of it lying between Ganjam and Bimilipatam, but on its approach to about the Meridian of the Light Vessel curving to the N. W. by N., so as to "land" between the Black Pagoda and Juggernaut, giving the Light Vessel and ships at the Sandheads a heavy Easterly and

E. by S. gale, amounting at one time with some of them who were close to False Point or on the parallel of 20° to a hurricane.

But in this case also there will be found abundant guidance for the judgment of the attentive seaman, who will see by placing his Horn-card on the Chart, that the wind at the Light Vessel is at E. by S. (shewing that the centre is S. by W. of him already) from the first, and E. S. E. (centre bearing S. S. W.) by the time it is really blowing hard, and thus he will not attempt now to cross in front, but get an offing and heave to.

To sum up these rules then. For the ships to the Northward (*i. e.*, on the right hand side of the track) of the Cyclone when the gale, with a falling Barometer, is at S. E. to E. S. E., they may if they have sea room stand to the N. E. to allow it to pass them comfortably, heaving to of course on the starboard tack when far enough out of its way. Between E. S. E. and East they may, if the Barometer be not too low and they have sea room to give the shores of Orissa a wide birth, with a stout ship and good helmsmen venture to cross, or if this be not advisable, heave to on the starboard tack when they have made an offing, if in an outward-bound ship, or before they run too far in if inward bound.

With the wind between East and N. E. to North. I have already shewn that crossing may almost always be safely adopted for the ships to the right (Northward) of the Cyclone path; and for those to the left (Southward) of it that they must not run into it fancying it a fine fair wind, or too far up if in its rear, as that is wholly useless, and may bring them into soundings with a heavy Southerly gale, and this much sooner than they expect, if the storm-wave and current are strong when the track is one near the Meridian.* All will, I hope, recollect that they have first to consider what their ship and crew can do, next what their best course is, and lastly in what position they may be if dismasting, or even loss of topmasts should occur; and this may happen from broaching to, or from sheer hard blowing, in the best ship. With an on-shore gale the resource of anchoring in the open ocean, which all the Sandhead anchoring, and most of that of the coast of Orissa is, becomes one to which no good seaman would desire to be reduced if he can avoid it.

Finally; I need not remark that in all this, both as to the expected

* See the case of the Albion in Note at p. 905.

Cyclone and what is to be done to avoid it, much must depend on the judgment guided by careful observation. Thus for instance a sea from the Eastward, crossing a Southerly one, with a bank of clouds to the E. S. E. are strong signs of a Cyclone, though it may be blowing fresh from the South at the time; and again if the bank is heavy to the S. S. E. that it may come up from that quarter. In a word, the vigilant seaman will watch every thing and despise no indication, and the dull and the careless will see nothing and be always too late; and then it will be said that "the ship was very unfortunate; but the under-writers have paid the damage, and the Captain, poor fellow, has lost his command!"

Description of a Colossal Jain figure nearly 80 *feet high, cut in relief, discovered on a Spur of the Satpoorah Range, in the district of Burwanie, on the Nerbudda.—By* Dr. IMPEY.

(Copy.)

From E. IMPEY, *Esq. Residency Surgeon, Indore,*

To Sir H. M. ELLIOT, K. C. B. *Secretary Foreign Department.*

Dated Residency, 30*th October,* 1849.

SIR,—I have the houor to submit through you, for the perusal of the most noble the Governor General, a report on, and drawings of, a remarkable object of antiquity,—a Colossal rock image cut in relief, and nearly 80 feet in height, situated on a spur of the Satpoorah range, in the district of Burwanee, on the Nerbudda, about 100 miles from Indore.

2. As the image is, I feel assured, of considerable interest, being the largest figure of the kind known iu India, and second only in magnitude to the Bhuts at Bamiyan, and has never been described, I have been at some pains to do so fully, and also been particular in the translation of the inscription found iu the reconstructed temple connected with the worship of the image, both of which are of the Jain persuasion.

3. I have reason to think from the character of a separate inscription found by me, that others may yet be discovered of more remote date than Summut 1223, A. D. 1167, which is however of so much value that it accords with, and fills up, a blank in the dates of some

Jain temples at Woon, also visited by me recently, and of which I am preparing a notice in conjunction with the Budhistical caves of Bang, of which a very imperfect description exists.

4. Should I be able to accomplish this object in the ensuing cold season, there will be left of the *known* remains of the Budhists and Jains in central India, the caves of Chundwassa, adverted to by (Col. Todd) alone that need detail.

5. For the drawing which accompanies this report, I am indebted to Lieutenant Macbeen, of the 74th Regiment, now at Mhow.

I have, &c.

(Signed) ELIJAH IMPEY,

Residency Surgeon.

Indore Residency, the 30*th October*, 1849.

(True Copy.)

H. M. ELLIOT,

Secy. to Govt. of India with the Govr. Genl.

From W. GREY, *Esq. Foreign Secretary to the Government of India,*

To the Secretary to the Asiatic Society,

Dated Fort William, the 15*th December*, 1849.

Foreign Department.

SIR,—I am directed by the President in Council to transmit to you, for communication to the Asiatic Society, the accompanying letter from Dr. Impey, Residency Surgeon at Indore, regarding a Colossal Rock Image in the Satpoorah range, together with the report, drawings and inscriptions connected with the same.

I have the honor to be, Sir,

Your most obedt. Servant,

W. GREY,

Foreign Secy. to the Govt. of India.

Fort William, the 15*th December*, 1849.

It was with some reluctance that in giving a title to the subjoined description of a very remarkable and interesting relic of the Jain faith and religion, now for the first time brought to public notice, I applied the word discovery, which is perhaps in many senses more suitable to a scientific deduction, but being assured by those most competent to give an opinion that priority of announcement is generally

held to be decisive of priority of discovery, I had less hesitation in using so ostentatious a term, particularly as it is becoming apparent from the announcements made almost daily, that there yet remain very many records of sacred and architectural antiquity unobserved by us, but matters of notoriety to every native around, and undivulged from no desire of concealment, but either from the apathetical habit of the natives in general, or their excessive reserve in speaking of religious subjects, upon which they are usually unwilling to originate a conversation.

The value and importance of the figure brought to light, and which may be most aptly termed a rock image, I have no desire to estimate unduly. I dare say those interested in these persuits, will glean from the following description all that is deserving of record and worthy of confidence in an antiquarian sense. I must content myself therefore with stating in this place, that the chief Colossal figure is not a statue, but a naked image cut in high relief out of the side of a hill of amygdaloidal trap, in the same manner and similar to the Bhuts at Bamiyan, and its full height must be ninety feet, at least that portion above ground, viz. about a foot below the knee, measuring seventy-two feet, eight inches ; and I believe it is, with the exception of a few figures, between thirty or forty feet high in the fort of Gwalior and one near Kussia,* the only one of the kind as yet known between the Himalayas and Cape Comorin, differing from those at Bamiyan, in being naked, and from those at Beligula, Einur and Kurkal in Canara, in being essentially a rock image cut in relief instead of being sculptured as a statue ; other points of comparison will be noticed in detail, my only fear is that in the hurried visit of a few hours which I was enabled to make, many subjects which might have been highly useful both in an historical and theological light have been left unnoticed or touched too lightly upon.

My notes were taken as far back as 1846, when I was stationed at Mhow with a troop of Horse Artillery, and should have been given

* In the Journal of the Asiatic Society Bengal, for June 1837, there is a colossal image described under the vulgar appellation of Mata Kooar; it is situated near Kussia in the Gorakpoor district. The height, though referred to in the report, is not stated, nor a sketch of the figure lithographed, but Mr. Prinsep, in a note, regards it is an image of *Bhoodha*.

publicity to sooner, but just as I was arranging them, I received my appointment to the Residency at Indore, and I was in hopes that I should ere this have had an opportunity of adding to, or correcting my first impressions; illness and other causes have however arisen to prevent this and I now furnish them with not a little diffidence.

It was on the occasion of my return from an excursion to the undervalued and imperfectly described caves of Bang, the extent and beauty of which however I hope to shew in a subsequent report (having been fortunate enough to discover few large Vehars, and several small detached caves, for the daghop only, and not chaitya cathedrals—anomalies I believe in Bhoodhistical excavations), when it was casually suggested to me to visit the Bawunguj. This proved to be the general acceptation of the height and the current name of the colossal figure, the chief subject under consideration.* It is situated in Burwanie, a considerable district in Kimar, on the left or south bank of the Nerbudda, under the chieftainship of an independent rajah, who has just obtained his majority. The capital of district is also named Burwanie, a few miles west of which run the first spurs that the Satpoorah Range sends off towards the Nerbudda in a north westerly direction. About seventeen miles further down they close in and meeting others from the north bank of the Vindhyan chain, form the

* Literally 52 guj. If we reckon the guj here alluded to, to be that in ordinary use on this side of India, viz. Malwa, viz. 30 inches, and we are hound to accept this standard in preference to the English guj or yard, which is chiefly used in cloth measure, and could only have come into general adoption with the extension of our power; and before that period the name in all probability had been given to the figure; we should have a supposed height of 130 feet to it. With its pedestal, if it has any, it could not have extended to this, nor does it approximate in any degree to my measurement of 90 feet 10 inches; hut the standard of 30 inches is not an approved or legitimate one, and the only one I am aware of that is, is the Illahie guj, of the Emperor Akbar, fixed by him at 41 fingers, and determined by Colonel Hodson, late Surveyor General in India, (Transactions Asiatic Society, Vol. 7,) from several measurements of the Taj Mahul and other Mahomedan buildings to be 31 inches and a fraction more than one-third, which would make the Bawunguj 134 feet $7\frac{2}{3}$ inches, a height utterly inconsistent and extravagant. I mention this, not that an approach to accuracy is likely to result from any hypothesis that could be drawn from a mere name, yet it is as well always to endeavour to test the statements of natives, particularly if traditional, to ascertain if there are any real grounds for their appellations though ever so common or unmeaning.

celebrated rapid called from its conformation the Hurnpahl or Deer's Leap.* The hills as they stretch toward the river present sharp defined outlines, and are crowded and heaped confusedly together, their summits for the most part terminating in peaks or sharp ridges, and rise from 14 to 1700 feet above the bed of the river, which at Chickulda, on the opposite bank, is 550 feet above the level of the sea; thus giving an extreme elevation of at least 2000 feet to the sacred peak, which is by no means the highest visible.

It is upon the east face of one of these hills, about 3 miles from Burwanie itself, distant upwards of four from the Nerbudda, that the Colossal figure is cut.

About a mile from Burwanie the first ascent commences, and from hence to the summit, is fully two miles of a most laborious, and in the hot season most fatiguing way, for there is neither shelter, stream, well, or tank to refresh the traveller. Colonel Franklin's description (in Transaction, A. S. Great Britain and Ireland, Vol. 1st) of the ascent to Samet Sikhara in Behar, is so applicable to that of Bawunguj, that I cannot forbear quoting it:—"The ascent, he says, commences by a narrow path in a winding direction, surrounded on both sides by the thickest forest. It is steep, with loose stones overspreading the road; as you proceed the ascent becomes steeper, and the summit of the mountain presents a stupendous appearance; no animal of any kind is to be seen. The ascent still continues and the forest begins to thin, &c. &c. and after some difficulty the summit is reached, from which is an inexpressibly grand view of what may here also be termed the jungle tarai on one side, on the other the Nerbudda stretching far and wide its alluvial banks, luxuriating in the most fertile vegetation.

It is after you pass the tabulated surface of the lower hill, and immediately at the foot of the steeper one, that the first appearance of "holy ground" presents itself, consisting of a small figure of Parswinath, seated in an enclosure, and iu front of it a rude square pillar resembling a dipmahl displaced, unused and almost fallen down.

* Sir J. Malcolm, in his Central India thus describes this rapid. "The name of the Hurnpahl is derived from the circumstances of the river being here obstructed by large masses of basalt, rising about 10 or 11 feet above the ordinary level of the stream, and giving passage through three very small channels, across each of which it is supposed an antelope could bound."

There are figures of the same kind but neglected, all around. The chief object, viz. the colossal figure and temple, being still much further up the hill, I could not stop to examine these minutely.

Few other traces of the proximity of the great divinity were perceptible until a rather sharp turn brought you literally upon heaps of statues, some 12, some 5 feet high, erect as well as seated, quietly ensconced each in his own secluded retreat. Opposite to these, on the bare hill side, was the great colossus himself.

The drawing* will perhaps give a better idea of the figure than any description; it is reached with some difficulty, owing to the large boulders and blocks of stone that have fallen down from above. As will be seen, it is Digambaree, and stands quite alone, almost in full relief.

The Deity seems in mental abstraction, as if undergoing "tapasya." The countenance is particularly placid and contemplative, and the figure presents generally the appearance of composure or repose, with the hands by the side. The earth and rocks that have fallen at the feet make it appear buried nearly to the knees, and detracts from its real height. It has no canopy, but on either side of the head some masonry of later workmanship evidently than the figure itself. That on the left is evidently brick work, meant perhaps to rectify and square the unevenness of the niche from which it is chiselled; on the right, handsome stone brackets act as supports to the recess. The hill being almost perpendicular, I was unable to make an accurate hand measurement, and had not the instruments to observe one; the only course left to me therefore was to send my guide round to the top of the hill, and from the crown of the head of the figure to make him let down a chord I fortunately had with me, to the ground, and as he did so, to leave marks or knots at the different places I indicated to him, such as the knees, pubes, &c. &c.; by this means I obtained a measurement as accurate at least as circumstances permitted. The extreme height to the buried part I find to be 72 ft. 8. in. The different proportions as follows:—

1. From below the calf to the Patella, ...	11 ft.	18 in.
2. To the extremities of the fingers, ...	6	8
3. The wrists and os pubis, ...	8	9
4. The umbilicus, ...	9	$9\frac{1}{2}$

* This will be given in a subsequent number.—*Eds.*

5. The axilla,.....	11	11
6. The shoulders and clavicles,.....	4	1
7. The chin, ...	5	0
8. The ala nasi,....	4	10
9. The droop of lower eyelid, ...	2	$\frac{1}{2}$
10. The arch of eyebrow, ...	2	2
11. The root of hair, ...	2	9
12. To the vertex, ...	2	10
Total,..	72	8

From the os pubis to the vertex being usually reckoned as one half the body, and that being in the figures 45 ft. 5 in., the extreme height should be 90 ft. 10 in.* and that portion of the body below the calf now under ground, according to the same calculation, should be 18 ft. 2 in. The proportions are however by no means sculptural or in unison with the above standard ; for instance, from the lower part of the knee† to the foot, or $\frac{1}{4}$ of the whole body, in the figure however it is only 15 ft. 5 in. instead of 22. 8 ; this would only give a height of 61 ft. 8 in. whereas 72. 8 are above ground.

Again, as will be noticed at a glance, the head is very much out of proportion ; properly it should be equal to $\frac{1}{8}$ of the whole body, but as it measures in the figure 14 ft. 9$\frac{1}{2}$ in. this would give a height of 119 ft. 4 in., and there are other disproportions which at once strike the observer, namely, the shortness of the neck, which is but two inches less than from the chin to the ala nasi, the squareness of the shoulders, and the closeness of the axilla to them.

The abdomen and right breast are much worn away, and the left thigh and right and left fore arms also mutilated, owing to great masses of trap boulders that have evidently been detached in consequence of the decomposing nature of the rock and its exposure ; green earth envelopes these boulders. The rock here is a good deal broken, which might lead to the inference that the figure must have been meant to be

* In confirmation of the accuracy of this measurement, a pundit, whom I sent up, took the measurement in some way not stated by him ; but he gives the height above ground 52 cubits, or 78 feet, and guesses that under ground 8 cubits more—i. e. 100 feet in total.

† To the bottom of the os pubis ought to be the same as from the knee.

clothed or Swetambaree, but there is no trace of an ornament, belt or clothing upon either the body or limbs, or between the latter, except the breast, which has a quadrated lozenge marked on it. The ear-rings reach to the neck, which is cut in wrinkles; the face is pretty perfect, with the exception of the nose, which appears to have been jointed on.

If we accept and regard the Bhudhistical estimation of beauty, we shall see little to quarrel with in this or other kindred figures, for hair, expanse of forehead and face, roundness of head, elevation of the nose and arched eyebrows, are, Mr. Hodgson tells us, among their thirty-two discriminating points. The figure is naturally coarse to investigate closely, but the *toute ensemble* is imposing. There was no trace of inscription any where.

In a small recess facing the great image, and a few paces from it, there is an upright figure of solid stone surmounted by a circular canopy which projects over it. It has three retiring borders, decreasing in circumference, and leading to a kind of dais, on the upper or flat surface of which a smaller figure is seated cross-legged. The arms are not on the feet, but hold a sort of pillow, which rests on the knee, or in the lap of the figure, and sometimes behind it. I scarcely knew whether to call this the sabeit or lacquered basket, one of the requirements of the Jainas, and which is round, or in reality a pillow, but the position of it behind the image sometimes is decisive of its being the ghadee. On either side of this small figure are elephants, each holding in their trunks an inverted Lotah, their feet resting on the lower margin of the canopy. Viewed in front the canopy has a festooned support. It is quite plain on the under surface, and without a fringe, and about a foot above the hair of the chief figure, which is like all Jain and Bhudhistical statues, short, curly and raised slightly, similar to a wig, and carried back straight to the ear. At the back of the head is the lambent flame of sanctity, for which Budhistical figures are also remarkable. On either side of this statue, parallel with the neck on the outer part of the tablet, are attendants, their heads circled with a small mughut, and holding wreaths in both their hands; their attitude is similar to those on the sides of the Daghop, at Karlee, and in the Keneri caves, that of flying; the outside one is a woman, the inner clothed, kurra or bangles on their arms and ancles; round the neck, arms and body a multiplicity of chains or the convolutions of one. I look upon this as

a mere ornamental chain, common to attendants, for the Zennaar or Janwi is seldom if ever seen in Bhudhistical sculptures, neither is it worn in this way in brahminical ones ; and the Jains in their rules for the very first class of ascetics "anuvrata," which are less stringently dealt with than the higher orders, enjoin the Janwi to be thrown away. Plate 14 of Moor's Pantheon of Mahadeva in the act of destroying Tripaisura, has a like arrangement of the chord. It is however worn by attendants only, and there are two others similar to the above, with the exception of bangles. They are immediately below the hands of the chief figure, which touch their head-dresses ; these head-dresses, like those of all figures attendant upon the Tirthankus of this locality, are peculiar, being spiral, with two, three or more coils or rings upon them tapering to a point. The nearest hands of the attendants rest upon a stone support, a kind of mace, or may be conch, with three convolutions ; of this I am not quite sure ; their lower halves as well as that of the chief figure, are in the ground. The outer part of the tablet by the arms of the chief figure is plain and not ornamented. The eyebrows differ from most images of Bhudh in general, in being turned up at the outer corner, the eye the while denoting repose, being prominent, but fully one half covered by the upper lid ; the nose is beautifully formed in shape aud proportion, displaying a very favorable contrast to those given to Bhudhistical figures, upon which however Jaiu sculptures seem to have greatly improved. The lips project, the lower one especially, and is very angular ; the chin is dimpled, and the cheek rounded, but the face is remarkable for breadth, being 2 ft. 5 in. from ear to ear ; the throat has 3 zones or creases round it, and on the breast is an expanded lotus, with 8 smooth edged petals euclosed in a lozenge. The nipples are traced ; the belly projects in the least just below the umbilicus, which is indented ; the thighs are round and prominent ; the gastrocnemii in proportion, and approach one another, but the image is unfortunately buried beyond this. The length of the arm, from the shoulder to the extremities of the fingers, is 4 ft. 6¼ in., the latter are in excellent proportion, and turn towards the thigh. The figure is beautifully rounded, and the sculpture is altogether of the most finished workmanship, and in point of art and symmetry very perfect ; too much so to be otherwise than modern. There are unfortunately of this figure but 10 feet above ground, and no more than 12 inches below the knee are

visible. If, as before, we consider the head equal to $\frac{1}{8}$ of the body, according to sculptural proportions, it would give a height of 12 feet or more, or taking the arm as 3 heads, 13 ft. $6\frac{3}{4}$ in.

From summit of hair to chin, ..	1 ft.	6 in.	
From chin to clavicles, ...	0	$3\frac{1}{4}$	
Clavicle to navel, ...	2	3	
Navel to pubis, ...	0	$11\frac{3}{4}$	
Pubis to knee, ...	2	0	
Length of arm,...	1	7	humerus to elbow.
Fore arm, ...	1	$8\frac{3}{4}$	to wrist.
Metatarsus and fingers, ...	1	$2\frac{1}{2}$	
Total,..	11	$6\frac{1}{4}$	

Nose $4\frac{1}{2}$ inches + 4 = 1 ft. 6 in. length of head.
1 ft. 6 in. + 8 = 12 ft.—length of figure.

But for the canopy and attendants one might consider this to be meant as a more perfect miniature of the great colossal figure, or as it is itself colossal, the Bawunguj, which we may call it par excellence. For this reason, and as other images will be met with precisely of the same kind, I have been particular in my description, lest there should be any misconception, and as we often gather more information from this source than even date affords, which are, I have little doubt, added generations or centuries after the erection of buildings, by some aspiring devotee.* The temple or recess on which it stands, is open toward the great colossus, and built of cut stone, graduating to the top. This seems to me to have been merely meant as an enclosure to preserve the image from the debris of the hill, which might tumble on it either from the force of rain in the monsoon or other disturbing causes. There has been no attempt at any kind of covering or roof for it, and it is now in ruins. About six yards directly in front of this, has fallen or

* Since I visited Bawunguj and wrote the above, I have had access to the marhle Jain statue in the Society's Museum, Bomhay, and it so closely resemhles the erect one, that the description might almost be thought to have been horrowed from it; the only difference apparent is the clothing of the chief figure and the position of some of the attendants. There is no record of where this marble statue was brought from; most probably Abu, hut wherever its hahitat, it confirms the identity both of the object, and the religion which actuated the sculpture of both.

been carried, a sitting figure of Parswinath, 2 feet 9 inches high; it is solitary and plain, the right hand and left leg uppermost.

In a more easterly direction are two other erect statues, half buried and evidently out of their proper places; the most westerly has the solar radiance opened out behind it, divided into 29 points, and is only two feet above ground: the other has been much more elaborately carved; the stone is lighter and brighter, and the proportion more graceful; it has no canopy, but the curled hair tied in a knot on the crown of the head, the stone out of which it was worked is gracefully finished, and in a heart shape behind; the two attendants are precisely similar to those on the first described image: 3 feet 5 inches of this figure are above ground. Further to the east is another built recess, 5 feet square, in which is a sitting figure of Parswinath, broken off unfortunately at the neck and 4 feet in height; the fallen head has the peculiar curled hair and is over-shaded by the naga, the palm of the right hand has an ornament which I take to be the lotus, though I have never seen it with three leaves. On the plinth is another trefoil, but I almost think the lower leaf has been omitted or worn off, and that it must have been a Srivatsa. There is in Lord Valentia's collection, and in all Ceylon Bhudhistical image, a flower of this shape, but with a fourth leaf on the hand of the seated Budha, and curious enough the leaves have serrated edges also. These are the chief attractive objects in the neighbourhood of the great rock image. Higher up the hill is a small plateau, where are the remains of masonry, the bricks of apparently modern date, or else the inhabitants of the district have adhered to, or perhaps taken the custom from previous ages, for the bricks are of the same size and shape and material as those made at Burwanie in the present day, and peculiar in their proportions,—14 inches long, 9 broad and 3 thick. Here are two images, one full length and erect, but buried to the waist, and similar to those described; the other is more ancient and set upon a pedestal as if intended for a niche. The figure is not large, scarcely 3 feet high, but differs from the others, being a female having very protruding breasts, and also in posture. It is represented as if seated on a bench, the left leg bent under the right knee. It has a canopy of 9 ribs, much resembling an umbrella, and its handle or stem runs down the left side. The face of the image is much injured, the hair visible and bound into a knot behind the right

ear. There is an abundance of ornaments on the arms and feet, and four rings on the neck, from the lowest of which two separate perpendicular pieces hang close to the breasts, underneath which they turn to the arm, which they encircle once. From the junction of the breast-pieces there depends the usual lotus within the lozenge. I imagined this to have been some ornamental chain, probably the Candora, which distinguishes the Seetambaree, and which is somtimes very long and entwined a good deal over the limbs, but from the general description, abundance of ornaments, protruding breast, and peculiar hair knot, I am inclined notwithstanding the posture, to regard it as a female deity, which we know were not uncommon with the Jainas, 48 being admitted into their Pantheon (see Bhudha Vilasa), and one among their Tirthankars. If I am correct she has a niche also in the small choultry upon the hill; the figures under her feet differ from those before described, and are rather remarkable. Under the right knee is a small one seated astride a tiger with the pillow under the left arm, and close to the foot an exceedingly small figure on its knee in a suppliant, almost in a weeping posture. The side is to the observer, and the head bent upon the left arm. Under the left knee the figure there placed also faces the last, but is seated, not cross-legged, the buttocks on the ground, the fore arms along the thighs, the elbows on the groins just as natives sit in the present day. Still ascending you enter near the summit of the hill a kind of rude gateway, with a small parapet wall on either side; upon a rising ground on the left are the walls of an old temple, which appears from the remains of the masonry to have been circular, with a vaulted dome; there remain in it yet two erect figures similar to that first described, of which there are several in the temple—now in use. Taking the path to the right and ascending some broken and irregular ground you reach the chief flight, which conducts to the temple; from the remains of stone, masses of bricks and mortar and figures jumbled together every where, the whole surface of the summit must have been built over. One erect figure is peculiar in standing isolated in an attitude not common in a divinity, but pertaining usually to Darpals,—that of listless attention, the hip being thrust out and the right hand leaning on it. Close to this commences the ascent of some 40 or 50 rude steps, which lead to a platform about 30 feet above the surrounding objects, but only upon one side, and evidently erected as a buttress or

abutment to the spur of the hill to the level of which only it is raised. The steps lead direct to the temple door, which faces the east, and must always have done so, there being no evidence whatever of any attempts at destruction. In Captaiu Stewart's remarks on Woon, great stress is laid on this direction of the doorway, as indicating itself of Brahmanical interference, the Jain temples there usually facing the north, and one, which is said to be Brahmanical, the east, but this is not an invariable rule, for Neelkunt Mahdeo's temple in the town faces the west, and at Hinnagund on the Kristna alluded to by Captain Wenbold, there is one which faces the east. Captain Stewart is borne out by Ram Raz in his illustrations of Hindoo architecture, and the custom in all Sivite temples in general, but the Mahawanso affirms that the *pulpits* in Bhudhistical Vehars always faced the east, the seats of the priests the north. In the Bawunguj the aspect of the temple and colossus coincide. In a temple where there is not much space to spare the chief object might naturally be placed fronting the entrance, as well for light as effect. In the Jain temples in Kanaree there are always 4 entrances. The Bawunguj temple is surrounded on three sides by a wall $5\frac{1}{2}$ feet high, it is 82 feet long, measured inside, and 54 feet in front; at about $\frac{2}{3}$ of its length, owing to the confined surface of the hill, the wall is contracted and closes iu $4\frac{1}{2}$ feet on each side, and in consequence is only 45 feet broad behind. Lengthways there are 16 recesses for figures of some Jain Iswarra, which from the wheel and lion being invariably depicted, I take to be those of Mahavira or Vaidhumana. 10 of these are in the narrow part of the wall, 16 in the broad, 11 in the rear. There are evidences of the wall having been continued some distance on either side in front adjoining the steps; it is however impossible to say decidedly how many figures there may have been recesses for, —whether any multiple of 24 or an indefinite number. In one of the temples at Abu I notice there are 56 mentioned, and at Indrapur near Belegula, there were 72 images (As. Res. Vol. IX.) but in 1807 only 42 were remaining in good coudition, placed in a gallery under a portico supported by pillars, which was carried inside along the wall. In the temple I am describing there was no space for these images, which were consequently placed outside. The presence of the court wall would seem to make the building resemble that species of temple described by Dr. Buchanan as a Basti; which, though signifying a hill,

is applied to an open area surrounded by a wall, but Gomat Iswarra is the only image placed in it, generally colossal, the 24 Tirthankaras being worshipped in the Basti or covered temple, and represented as naked and sitting, exactly of the same form which will be found presently to be the case. This would give a composite character to the edifice embracing both descriptions. The temple itself, save in the admixture or variety of stone used, has the appearance of a modern structure externally, which the repairs and addition necessary to protect the figures inside have effected ; its dome is completely so, but on entering that impression immediately ceases. It consists of an outer verandah in front, an inner square chamber, a vestibule, beyond and in rear of it the sanctuary for the chief object of worship, which here is the Prabathee, or impression of feet, 4 in number, two large and two small. The verandah is approached by 8 steps, and is 15 feet long by 9 feet wide ; the pillars supporting it (with the exception of the four immediately in front, which are very old and of the amygdaloidal trap which forms the hills, surrounding wall, and even the figures in the recesses) are of yellow coral limestone, brought from Dedhallee, on the other side of the Nerbuddah.* The roof of the verandah is flat, with the lotus inscribed within the lozenge itself within a square. On the north and east walls are niches containing an elephant upon which is some retinue of figures, 5 in number, the last, on each side near his tail, supported by an erect figure carved on the flanks or thighs of the elephant ; they are all seated, the foremost holding a lotah. This seemed to me a complete anomaly in Bhudhistical or Jain sculptures. I have never seen them depicted except in a group or tableaux, while here they are represented more like Krishna's Gopia, save the matter of sex, and do not give the idea of being the Ganadharee or Ganadhipa, or followers of any of the Tirthankaras. The entrance from the verandah into the Mindra or principal chamber of the temple, is by two doors in the same wall, the outer much larger than the inner, being 8 feet high and 5-6 wide, while the latter was 5-4 high and 2-8 only in width. The posts and

* Of the existence of this bed of yellow limestone I was not aware, and do not yet know its exact locale, but I took pains to hunt out the red variety of similar geological character, and of which the Mahomedan tombs and temples at Dhar and Mandee consist, it is found in situ at Neemkeera on the Maun Nuddee, in the heart of the Vindyan range below the Hydree ghaut.

supports of both doors, as well as the flanking pillars of the outer, being modern and of coral limestone. A descent of two steps leads into the chamber, which is 16 ft. 3 in. square. Exactly a foot on each side of the doorway the pilasters commence; the intercolumniation being tetrastyle and the pillars four feet apart. The pilasters are nearly all dissimilar, and resemble the first pillars visible; the centre ones are different and more modern, all 6 ft. 8 in. high, supporting slabs across the ceiling, above which is cut the lotus within the lozenge and square, a form found likewise on the roof of the verandah and sanctuary itself. There are two plain sitting figures on each side of the doorway, as you enter, and in the centre of the side walls 20 others 5 feet high, and raised 3 feet from the ground on a Sinhasa; that on the left wall is Parswinath; he has Seshnaga or Dhare Nadarn for a canopy, with the lotus engraved on his breast. The opposite figure on the right wall has no covering, but the hair merely; adjoining there are four others also seated, but smaller. On the wall facing the entrance, and between each pilaster, are figures of quite an opposite character, viz. erect; the principal one is on the left; it is almost precisely the same as that met with on the hill below, but lighter and more fitted for a room; the head canopy is most richly carved and has festooned supports at the sides; the elephants have lotahs on their trunks. If there is any difference it is in having outside the wreath-bearers one row of figures, the upper with stalks of the lotus over the shoulder, and the lower resting with their hands on maces or staffs. The forefingers of the chief image are not extended on the thigh, but bent over the middle ones. There are altogether 20 images in this temple, 3 large and 17 small. On the north side of one of the figures of Parswinath there are 4 short lines scratched but very much worn and too indistinct to copy; opposite the outer entrance is that to the inner chamber, which has a most elaborately carved doorway and six receding pillars with square and projecting capitals cut in the depth of the wall. A descent of two steps leads into a little vestibule 6 ft. 3 in. square, in which are erect figures, also similar to the previous ones. From this vestibule is the entrance to the sanctuary, which is quite plain; a small altar is raised in front of the door about 2 feet high and on it are carved in relief two feet, very large flanked by two others somewhat larger; there is no other ornament of any kind, but a little miniature on the pedestal with round ear-rings; about the feet were grains

of rice and flowers, giving proof of the recent presence of devotees. The same objects, viz. representations of feet, were found not as chief objects, but at the foot of a statue in another very small building on the extreme edge of the same hill to the west, very similar to those seen in Colonel Todd's plate of the temple of Kamalmair. In the centre of the enclosing wall of the large temple is an opening leading along the spur of the hill to this building, 20 paces distant; it has a cupola made of brick and coarse plaster, very uneven; it is only 7 feet high and 5 square, with an entrance of 2 ft. 10 in. through which it is of course necessary to creep inside, and too low to admit of standing straight when there, probably meant to cause the necessary degree of prostration to the deity. Facing the door and by itself was a tolerable sized Jain image in an attitude not found elsewhere among the figures either above or below or in the temple, viz. that of supplication; the palms of the hands joined together, the extremities of the fingers pointed upwards and the thumbs on the breasts. As a curious coincidence I may mention that there is a very old figure of exactly this character and posture half buried in the land in the neighbourhood of the Jain temples at Woon. There were two attendant figures below this, the outer hip thrust out, upon which the outer hand rests, the inner leg bent and the corresponding arm supporting a substance more like a lengthened bell; sic-in-origine, my memory does not serve me as to the exact nature of this emblem, but from its having been held over the head of a figure in another place it must be a rude umbrella, though as well as I recollect it was precisely similar to those surrounding the Gaya, Buddhistical figures at plate 70, figures 6, 7, 8, of Moore's Pantheon. On the right wall is the same figure cut in marble with a lotus carved on the breast, it is apparently of recent workmanship. The group is rather remarkable, for underneath are two figures, right and left, the former holding the oblong-shaped symbol over the head of a lower figure, which is kneeling or seated upon one leg bent underneath, the hands in front in the act of supplication, and *a chord with tassel leading from the wrists to* a jug or jar which is placed near its right foot. The left figure is on both knees and two jugs are near it of a double form.

On the pedestal are the following letters:—

वर्द्धमान राक्षस, १६५९ Wardhamán Rákshasa, 1659.

On the left wall are two large figures, one holding a lotus over the

shoulder, but subordinate to no other that I could perceive, this was decidedly Svetámbara, and the *only one*, the cloth hanging down to the knee and covering the belly and hips. On the pedestal were a pair of feet, the soles turned up and the toes turned outwards; next to this were two figures resembling the solitary one on the ascent of the hill, apparently very old; they were seated as if on a bench, one leg bent under the other, which was defending a child on the left knee, with its right hand to the left breast, both of which were unusually large; the mace iu one hand of the figure and some fruits in the other; a lion under the right knee.—This seems a further confirmation of the solitary little figure on the hill being female, and had it four arms, would be Bhaváuí and a recognition of a deity of the Hindoo Pantheon that one would not expect in conjunction with such unequivocal Jain figures. As nature personified, she is admitted by the Jainas as a Devi, and gives a name to a class, Bhawánipatis; one or two are worshipped daily by them, and her place by the side of a Tirthaukara is in correct keeping, but this figure has not a multiplicity of arms, and as we have a Jain Tirthankara, "Sumati," and according to the Svetámbara, a second Malli-náth, there is no occasion to stretch a point or trespass upon the Hindoo mythological system. There was nothing further of importance in this little building, so I retraced my steps to examine the figures in the recesses of the enclosing wall. Of 43 niches there were 3 empty, 4 figures only were erect, the rest seated cross-legged, and but one with the suake canopy of Parsvanath; they were all very ancient, evidently of the same rock of which the temple and hill were formed, an amygdaloidal trap with decomposing nodules, which left a white, red, or green appearance or incrustatiou upon them as they happened to be constituted; the recesses were constructed by one slab forming the roof or upper part, on the either side, and rough uncemented stones the sides. The group was ranged usually in the following manner on a slab. I must premise that both sides being alike, the description applies to the whole group. Directly in the centre is the chief figure seated with the hands crossed over his feet, the right uppermost, over his head a canopy, with two or three retiring ledges or circles, upon the uppermost of which was also a figure sometimes seated, at others kneeling, either on one knee or two, and supported by a round pillow, which was either plain or tied in the middle; some little distance apart at each corner of

the slab, parallel with the head, was a small figure always seated, and occasionally in a portico by itself. Between it and the canopy, with their hind feet upon the head of this seated figure, was an elephant, the trunk down, frequently with Bodhisatvas on its back, or between it and the canopy two small figures with their knees bent under, as if clinging to the canopy. Under the four feet of the elephant, close to it, still parallel with the head of the chief figure, two small flying figures bearing wreaths in both hands, the nearer clothed, the outer a woman with fruit in her hand. Directly under these, along the arm of the chief images, a full length figure, its nearest hand supporting the feet of the flying figure above, or with lotus stalks carried over the shoulder, and the outer hand with karrá, &c. On the corresponding hip or thigh, these are always clothed and have the spiral caps of attendants. Outside of these, and of the same height, is another erect figure, the near hands in respect to the large image resting upon a fish, bird or club, the other by the side. At the feet of both of these below, but outside the knees, there are two small figures, one seated cross-legged, the other as if on a bench with one leg dangling, the right hand holding a staff; these seldom vary. Outside of them again under the small figure seated in the corner above, is a pillar supported by pigmies (zujalya) having for its shaft a tiger rampant, on a reclining elephant as its base. Immediately under the knees and feet of the chief image are four diminutive pillars, between the outer of which is a lion facing the wheel, which is in the centre. This latter is but the personification of the earth, or two cups meeting at the base, according to the Jain belief: the flat surface at the junction, the earth—it presents no form of the praying wheel pictured by Colonel Sykes in his notes on the moral and political state of India, and is represented with its tire in front, not its broad axis.

In those which seem very old and weather-beaten there is a second figure over the first in a little porch supported by birds, with wings endorsed on each side; on a level with its knees two others similar to it, under which are the elephants. Where the principal figure is erect the niche is carved a good deal, and there is a pillar on each side, the tops of the figures of one hand touching a club or bird's head.

From the above rough notes it may fairly be deduced I think that the

colossal image, as well as all the other figures, are Jaina. I cannot trace one single symbol of Brahmanical intrusion, and in this there is a striking singularity; in every other situation and country it has struck me to be so universal as to amount almost to a law or principal that wherever edifices, temples or caves of any religious persuasion abounded, that was selected by the holders of a rival and succeeding creed as the spot to establish themselves, and to vie with their predecessors in magnificence and extent of structure. Such is not the case however either with the colossus or temple of Báwangaj, nor, with the trifling exception of a single insignificant image of Ganesa, is it so at the caves of Bang. This may possibly argue no very great antiquity for them, but it enables us in this age to see them unmixed and in their purity, seathed only by the ruthless hand of time. It is not the least remarkable part of the colossal figure at Báwangaj, that it is the only one of the kind as yet known in India. There are statues at Kanara, at Belegula, 70 feet 3 inches high; at Einur, 35, and Karkal 36-6. The largest of these is variously computed 18 times a man's height, (18 fathoms and) 6 times its own feet, which is 9 feet, e. i. 54. This is so exactly the half of 18 fathoms, or 108 feet, that there must have been some error in reckoning the fathom, however the true height, according to Dr. Buchanan, is little more than 70 feet. The Báwangaj must be at least 90, it being 73-8 to the calf of the leg alone. The height, nudity and posture of the Kanara figures and their dedication to Gomat Iswara, or Indra Bhuta, the disciple of Maha, proved now almost beyond question to be identical with Buddha himself, indicate resemblance to the Báwangaj figure, and the differences perhaps consist in respects which may be considered merely local, for instance, the hair is arched, not cut straight across the forehead; the earrings do not touch the shoulders, and on the arms and legs are traced branches of a tree with leaves which arise from a series of mounds behind, and between the legs, one for each arm and leg. In India the figures that approach nearest to Báwangaj in point of construction are those in the hill fort of Gwalior, of which there are very meagre descriptions. Mr. Fergusson says of rock cut temples, that "the colossal figures, some sitting, some standing, some 30 or 40 feet high, have sometimes a screen before them which form a small chamber," and Colonel Sleeman thus depicts them in his Rambles of an Indian Official: "On the face of the rock between the glacis and foot

of the wall are cut out in bold relief the colossal figures of men sitting bare-headed under canopies on each side of a throne or temple, and in another place the colossal figure of a man standing naked and facing outward, which I took to be that of Buddha." Of the colossal figure of Mata Kooṉar in the district of Gorakpore, Mr. Prinsep has not thought necessary to give the height or a sketch. His opinion of its being a figure of Buddha is sufficient to authorize its reception as such, but the omission is unfortunate for comparison sake. He states, it is surrounded with smaller compartments, descriptive of various acts of Buddha's life, surmounted also above by angels and gods, and below supported by the Sinha and elephant, and is probably connected with the Mathia Lat, described by Mr. Hodgson, Asiatic Society's Journal, Vol. 3. Mathia being evidently the patronymic of Mata and Kooṉar or Kunwar, a corruption of Kumára, the youthful, or god of war. Mr. Liston's description however shews several points in which it is dissimilar to the Báwangaj rock image, which is either essentially Jaina or of the esoteric Buddha creed. Mata Kooṉar is associated with devatas and attendant figures on each side, with flames around their heads, and their hands on goats, and the lotus over the shoulder, whereas every thing about the Báwangaj is particularly plain. The only other hill figures an account of which has been published, are the 3 Bhuts at Bamiyan, the largest of which is 120 feet high; these, though traditionally said to have been inhabited by Abraham, and to have been excavated before the flood (Colonel Wilford, Asiatic Researches, 6, Vol.) are considered by every traveller to be Buddhistical. Mr. Masson, the latest visitor, says, they are in the same attitude as the figure at Kanari, that of preaching, and the paintings are similar all over the caves. Sir A. Burnes is the only author who makes allusion to their Jain extraction, and thinks the paintings over the idol to have a close resemblance to the images of the Jain temples in western India, as Mount Abu at Girnar, and Palitana in Kattywar, and can trace no resemblance to the figures in the caves of Salsette. Notwithstanding such high authority, they can scarcely be said to belong to the Jain faith, as we know it. Their figures are never in such a posture, and the clothing is thrown loosely over, exposing the right shoulder; the Bamiyan figures besides were in existence at a time when the Jain religion was certainly not in the ascendant, while Buddhism as certainly was.

Mr. Prinsep states, that it was in the height of its glory a century or two prior to the Christian era, from Kashmere to Ceylon, and M. Remusat, from the examination of Fa Hian's travels, that so late as the beginning of the 5th century Buddhism was flourishing in the same regions. These therefore have little in accordance with the Báwangaj image. I have of course excluded from the catalogue of rock images, that at Dewass, described by Lieut. Conolly (Prinsep's Journal, Vol. 6, page 855), as gigantic, because it is so completely Brahmanical, being a form of the Sacti of Siva, under the name of Chámundá. One of the principal matters of interest however connected with both the rock image and temple, is the date that can be assigned them, if we can depend upon those we meet with on buildings, which I am almost persuaded are in many instances the handiwork of regenerators, not founders. Information on this head resolves itself into the evidence afforded by the temple and figure separately as well as conjointly, and it is important to prove the connection of both if possible, for though the worship of the Prabatha, Paduká, or representation of feet, and the numerous emblems of the lion in the recesses, and the inscription at the foot of one of the most modern figures may perhaps, in conjunction with the nakedness of all to induce us, attribute them to Vardhamána Mahávira. The manifestly abandoned state of the colossal rock image and the figures in front of it might lead us justly to the inference that it had ceased to be an object of worship, which if they were one and the same divinity, would not be probable, and I cannot but admit that the nakedness of the figure making it Digambara, the admitted antiquity of this sect, their great prevalence in Rajpootana, (though the Swetámbara, according to Lieut. Conolly, are more numerous in Malwa, Op. Cit.) and their devotion to Rishabha, the 1st Tirthankara, and acknowledged chief saint, his extreme height 500 poles, or Dhamish (albeit imaginary) the fact of his primitive shrine being at Abu, and a temple and large figure being dedicated to him at the top of a high mountain, Satrunjaya near Pálithána* in

* Palithana, near Bhownagar in Kattywar, is as celebrated a place of pilgrimage for the Jains in the western side of India as Samat Sikhara in Behar and Belegula in Canara; there are a great number of temples on the hill, and a treasury so large as to be placed under the management of four large bankers, two of whom are inhabitants of and reside in Ahmedabad, one in Bombay, one in Jeysulmeer. The Calpa Sutra, page 10, says, "there is no holy place superior to Sri-Satrunjaya."

Kattywar, under the appellation of Adhiswara Rishabhadeva, called by the Srawaka or laity, Adi Bhudha, and to which there is a large annual Tirtha, and the circumstances of the exact spot in which his apotheosis took place being undecided, being the mountain of Catachachal, according to Major Delamaine, and Ashtapáda according to Mr. Colebrooke, are circumstances not to be rejected in attributing the colossus to him. Yet if it were his, the brahmins who admit him into their mythology as 2nd in a list of kings in their regal families (Bhagavat Purána, and Dr. Stevenson in Kalpa Sutra) would be likely to have some more certain records of him, and he would have the chief, not secondary place in the temple, unless in the recent changes it has undergone, the substitution of Mahávira as a later and better known divinity may have been made, and the Báwangaj and other divinities have been forsaken and deserted on account of some imaginary superstition or ill fortune, which Dr. Stevenson assures me, is among the Jains not an unfrequent occurrence. To whosoever honor the colossus may have been originally cut—whether Rishabha or Vardhamána,—and one of the two it must have been,—the worship of both it and the small statues near him, including one or two of Parsvanath even has passed away. The inclusion of the latter in this desertion, shewing the correctness of Dr. Stevenson's surmise, for notwithstauding this, the temple on the hill gives a place to them and to more than one of the 23 Tirthankaras besides, while all those on the hill below are perfectly neglected. There are however many difficulties to overcome and reconcile, which are not a little puzzling. Rock images, in a general sense, we may naturally suppose to have been cut in rude, if not ancient times, and in truth every thing carved on rocks bears on this fact also the stamp of antiquity, and is associated with such in our minds. Whether images, temples or inscriptions, they leave with us an impression that the projectors of such were in a degree in ignorance of the state of art, if any such existed, before their time, and that their conceptions were rude and imperfect, and this has particular reference to sculpture and statues. We can scarcely conceive it possible that the individuals composing, for instance, such a large and numerous sect as the Jains, spread over such an immense tract of country, could in the 11th century have been so totally unaware of the science of sculpture as to cut such ill-shapen and disproportioned images in the face of a hill, with examples of the beautiful works of

previous centuries within 40 miles of the caves of Bang, and leave it exposed to the destructive force of the elements. Preservation scarcely one would imagine could have been had in view in snch a course, yet experience has proved that rocks and nature are more commemorative agents than all the art of man. The Bamiyan figures have withstood the play of artillery; the cave temples, the sacriligious chisel of the sculptor, and notwithstanding the injuries so caused we can trace through them some evidences of the originators of these antiquarian monuments; not so with the later and more approved custom of enshrining withiu temples, desertion of these latter being almost equivalent and synonimous with destruction. In the Báwangaj figures we have evidence of a succession of science; all improvements upon the great figure, the more finished execution being, we must naturally infer, the most modern and the reserve the evidence of antiquity. In chronology we often, as in this instance, can discover no era or date to guide us, and when we do, are disposed to regard it as a source of error at all times magnified and perverted by the stroke of a pen; we therefore seek to derive from the observation of the natural characters of sculptures and figures the intentions, tenets, and opinions of the framers, a method of reasoning applicable to times and edifices within our own eras, and in a great measure decisive and indicative of uational character. This is especially applicable to the varied sculptures found at Báwangaj, the great rock image being the most rough and artless, while the smaller but still colossal figures placed opposite to it,—images it may be of the same divinity,—are most perfect and polished in comparison. I do not mean to infer that the antiqnity assumed from this source is sufficient to warrant one going back to the Dwapar Yug, aud fixing upon Rishabha* as the deity personified on account of his antiquity, (for there is ample time for Mahávira to come in, his apotheosis being 569 B. C.) but there are strong grounds for the former suggestion, as well in this as in the fact of the images being erect as well as sitting. Parsvanath, and

* Rishabha.—If any credit is to be attached to the date of Rishabha's apotheosis which took place 3 years 8½ months before the end of the 3rd age, and we admit the Jain method of commencing the Kali Yug or 4th age, as 1078 B. C. we should have a positive date to Rishabha of 1074 B. C.—comparatively a recent one. The Brahmin date of the Kali Yug is however much better fixed and established, and by it his date would be 3098 B. C.

whatever other Tirthankara is represented, being without a fringe to the canopy, denoting an inferiority and apparent subordination to the great figure, which, as Mahávira succeeded Parswinath, would not be likely. I am free to confess however that the subordinate nature of these is but a conjecture of my own, but I may safely class with the same date and period, the temple itself and the figures in the recess, though not those inside either the temple or choultry.* Of the date of the temple I shall have occasion to speak presently. The seated figures on the tablets in the recess of the court wall, accompanied by the almost invariable emblem of the lion, would point to Mahávira, the only Digambara-Tirthankara known, and several reasons of weight conduce to his coincidence with the rock image ;—1st, the precision of his era, which unlike Rishabha is not disputable,—the likelihood of Rishabha's being little more than the first ascetic, not the extensive promulgation of the faith ; the inscription on the small temple Vardhamána Rakshasa, the worship of the Prapatha or Paduka,—almost exclusively his own, both in the large temple and at the foot of a statue identical with the small figures opposite the colossus. If heights can be trusted, and are not as frivolous and exaggerated as dates, and we proceed in the ratio of decrease, which the Tirthankaras are made to do, viz. from Rishabha to Sitala, by 50 poles, Sitala to Ananta by 10, and Ananta to Nemi, the

* The only support to my supposition ragarding the inferiority of the small figures is the very slight one of the name by which two of them are at present known —" Oodura" and " Doodura" and here again the common appellation of figures may tend to establish a clue from which more positive data may yet be arrived at. After hunting over many lists for those names I fell in with one in Vol. IX. A. Res. received from Charucirti Acharya, the Jain chief pontiff at Belegula. It would appear that according to the Jain belief there were born other 24 Tirthankaras in the world during the first age, beside the 24 after Rishabha. Among the names of these Tirthankaras of the Antacála or past times, stand Odara, the 8th, and in a note of Mr. Colebrooke's, a corresponding list is given by Hemachandra Acharya, the author of the Abhidhána Chintámini in which the 8th is called Damodara, a name to this day used frequently as a first name by the Sarawaks, though claimed as usual and applied by Brahmins to Vishnu. Unfortunately this coincidence of name has not as yet led to any date, but there doubtless is one credible and substantial and much less apocryphal than the Tretá Yug, and connected with some Sádhu or Guru, for the Jains pay a respectful adoration to those who obtained Moksha in times of antiquity, even more assiduously and with greater veneration than to the Tirthankaras who were incarnate in the Utsarpini period.

21st and last whose absolute height is given by Mr. Colebrooke, viz. 5 poles, we may suppose Mahávira to be within bounds, and have another ground for ascribing the rock image to him. We know that Mahavira's apotheosis took place at Pawapuri, in Behar, but the Jains worship as well the places where their Iswarahs were begotten and born, where they resigned worldly pleasures and began to meditate, as well as where they obtained Nirvana, though I am not aware that any of them took place in the district of Burwanie. A closer study of the figures and emblems, and digging round the pedestals and feet of the statues where the chief events of the Deva's life are usually represented, will, I dare say, elicit more accurate information, and an enquiry made into the records of the town of Burwanie, and conversation with the Jain devotees at the period of their tirtha, would doubtless assist materially and lead to much more certain dates than a cursory visit of a few hours. I am however much afraid that we shall light upon no very remote date, either for the figure or the temple, for although on the authority of the Yappa Jaina Patavali (Trans. A. S. Great Britain and Ireland, Vol. 3), written by Calca Acharya, A. D. 415, Jain temples were first built in the year 882, after Virat, i. e. A. D. 313, during the spiritual government of Mandeva Surie, I have not yet (with the exception of the temple of Kurswa near Katah, whose date is given by Colonel Todd unmistakably S. 597) seen an inscription of earlier date than the 12th Century. The Abu temples, reckoned the most ancient, have then 1,100 and 1,400, and almost all those in Behar, at Nakkaun, Pari and Calurpur near Champanagar, have them respectively somewhat 1676, 1605, 1694; and the temples of Woom in Nimara, date 1192, 1203, and 1243, 1263. In Rajpootana they are about the same age—Nadole some with 1208, Jabrapatan 1103, Kuraira 1400, Cheetore 1449. We thus bring the most flourishing era of Jainism in respect to architecture, to the 11 and 12 centuries, and this tallies precisely with Professor Wilson's opinion; he says the Jain faith was introduced in the Peninsula 7th century, A. D., its course south was stopped at an earlier period, but it extended itself to the west and centre of India, and enjoyed some consideration in the 10 and 11 centuries." We must of course take this as its resuscitation or revival after the obscurity into which it was thrown by its rival creed, Buddhism, and which lasted nearly 1,000 years. Professor

Wilson conceives however, and is there met by the Behar inscriptions, that it received its final overthrow in the 12th century. The date of those I have given above would certainly indicate that the religion every where had survived the persecution in the 9th century of Sankara Acharya and Kumarilla Batta, and I hope to shew presently that the Jain temples at Woon, not 80 miles distant from Báwangaj, were, if not built, at least repaired, and a colossal figure set up in the reign of Yasovarmá Deva, sovereign of Dhar in 1192, fourth in descent from the 3d Raja Bhoja. Mr. Ferguson thinks the Gwalior figures to be of the 11 or 12 century,—an assumption which would imply a degeneration in the arts gradatim, or in ignorance of those of previous ages, which is contrary to the experience of all nations. It is scarcely probable for such a descent to have occurred from the beautiful and finished sculpture of the caves of previous centuries, both before and after the year of our Lord, to such rudeness and disproportion. Major Delamaine asserts that none of the temples at Mandu are earlier than the 12th century. There were several inscriptions in the Balbood character in the Báwangaj temple on each side, but I had not time to copy them, subsequently however I obtained the services of a pundit to do so, and he sent me four, one from each side, leaving one very old uncopied, it being too much worn to be taken off. Perhaps from this very one we may yet learn more than all the others put together.

The inscriptions he has sent consist of four or five, and from the Sanskrita form of the letters and modes of expression, do not appear very ancient: there is a possibility of his having departed from the real character of the letters and transcribed them in modern Balbood, the language best known to himself, but I think that this is not the case, from his having gone out of his way to explain in Sanskrita the meaning he conceived to pertain to them, his version being very wide of the mark; for this reason I consider them facsimilar and not without their interest. They are inscribed one upon each wall of the temple, and one over the door, and bear distinct dates, with an interval of 293 years—nearly 3 centuries—and it is remarkable that the name of the temple should be preserved or adhered to for so long a time, considering the peculiar ideas of the Jains regarding names. The inscriptions which are on the eastern and southern walls, bear date Sumbut 1223, of

Virkrama, I presume, as we are in Malwa, corresponding to A. D. 1166, and are both eulogiums upon Rámachandra, said to be the founder of the temple. The phraseology of the eastern one is particularly poetical and beautiful; language more chaste and emblematical could scarcely be selected, or associations more pure than that applied to Rámachandra's fame, which is described as white as the moon, the kunda flower and snow. The southern inscription specifies Rámachandra as the builder of the temple, and departs from the name of Indrajit, given to it in the preceding one, changing it to Surapatijit, a cognomen of the same deity. It also gives an outline of his connections, making him of the family of Devanandamuni, and pupil of Lokanandamuni, and adored by *Vana* Raja, the Lord of the earth. Here is a distinct name of a sovereign and, it would have been very satisfactory to have discovered a reigning prince in him, but there is none to whom the name applies. The nearest approximation in sound is Vana Raja, of the Anhilwarra Dynasty, but his era was 417 years before, at which time it is just possible the first temple was built during his reign, Samvat 802. Who the reigning prince of Avanti in Samvat 1223 may have been, is not quite clear, but I think it can be fixed. From an inscription of Colonel Todd's, given in the Transactions of the As. Soc. Gr. Britain and Ireland, of a Copper plate grant found at Ujjayina, the ages of several kings are satisfactorily determined, and it would seem that in Samvat 1200, only 23 years prior to the Indrajit temple inscription, and Lachsman Varma, the 4th in descent from the 3d Raja Bhoja, was the reigning prince at Dhar, the then capital of Avanti, subordinate to Jaya Singh of Pátan, who had conquered his grandfather, Nara Varma, and reigned in chief from Samvat 1150 to Sumbut 1201. The successor of Jaya Singh, in Mr. Prinsep's list, is made his son Ajayapala, without date, and on the same authority in the Malwa line, Birsal is placed next to Lachsman Varma, but Colonel Todd's inscription gives a successor to Lachsman, viz. his brother Jaya Varma. Unfortunately this part of the plate was corroded, and the date could not be made out, but it is not too much to assume that as Lachsman reigned in Samvat 1200, and was above them, either he or his brother and successor, Jaya Varma, was in power in 1223.*

* Colonel Sykes, in his notes on the moral, religious and political state of India,

For a century or two about this time both, in Malwa and Rajpootana, the Jain creed appears to have been in its zenith. The temples at Woon, about 50 miles distant from Báwangaj, bear date 1203, 1243, 1263. It would seem almost as if the Báwangaj temple filled up the blank of 20 years which the Jain temples bear relatively to one another, and which they may have occupied in building or completion, the workman and every available assistance being given to effect it. Thus Woon 1203, Báwangaj 1223, and Woon 1243, ditto 1263. A prior date of 1192 on a figure at Woon is the very year of Col. Todd's plate, which has Lachsman Varma's sign manual, and in 1218 according to another plate of Col. Todd's, Aldan Dera Achohun prince built at Hadole a temple to Mahávira. Of his persuasion there is no doubt, scarcely of Jaya Varma's. According to the Camarapala Charitra, his ancestor Boja was a proselyte to the Jain faith, and his father, Yasovarma's grant is thus worded: "The great prince acquaints the people, Pattalica brahmans and others," making the brahmans a sect separate and distinct from the people, added to which Jaya Singh of Pattun, from whom Yasovarma held in feoff, was of the Anhulwarra dynasty, remarkable for their adherence to Jainism, and himself in particular. It is not without some reason then we surmise that the temple of Indrajít, if really built in 1223 by Rámachandra, was designed and constructed at a time when the Jain religion was flourishing in the territories pertaining to Avanti. From the honesty with which the repairs of the temple is recorded in the next inscription, Samvat 1516, we may at least assume its having been erected, by Rámachandra, until we can discover prior data.

From the specification of its being the large temple which was repaired, it is to be inferred that there were others at hand which, as I have previously noted was the case, the summit of the hill being strewed with figures in its bricks and mortar, and the frustum of one distinct temple. The sovereign named in the inscription over the doorway is

gives an inscription for Piplianagar and Bhopal on Copper plates, from which the succession appears as follows :—

1. Raja Bhoja Deva,	6. Vendhayavarma,
2. Son, Udayaditya,	7. Son, Amushyavarma,
3. Naravarma,	8. Subhatavarma,
4. Yasovarma, A. D. 1137,	9. Son, Arjun.
5. Jayavarma, A. D. 1143,	

In this list Luchsman Varma is left out, but the date of Jaya Varma's reign corresponds exactly with Colonel Todd's plates.

called *Mahummoond* Rajah, of the Soorsein family. At that period Malwa was subject to Mahomedan power entirely, and likewise Gujerat and the greater part of Rajasthan, the ruler of Malwa in sumbut 1516 being the celebrated Mahmood Ghiljee, the 1st. It is curious to find him styled Raja and his family and race brought into a record of a temple of a Hindu deity. Surasena is doubtless meant for Suryasena, of the race of the sun, but it is a brahman term. However it speaks volumes for Mahmood's toleration and character.—Ferishta, who is an author of equal credit and celebrity, states that both Hindu and Mahomedans were alike happy under Mahmood's sway, it being his policy to unite them in ties of concord and amity, and they consequently in his reign enjoyed prosperity and repose in an unusual degree. To no other prince can a reign be assigned at this period, and it was in the 16th year of his reign that the temple was repaired. Mahmood succeeded to the throne of Hindoo in Samvat 1500, and reigned for 34 years. Under his government Malwa reached its highest prosperity as a kingdom; its territories were bounded by the Satpooras on the East and Bundlekand on the West. We are thus enabled to refer both inscriptions to reigning sovereigns comparatively modern it is true, but we may yet discover others who will assist to fill up the many blanks that historical catalogues require. In the later inscriptions of Samvat 1516, the Ratnakirti take pains to describe his spiritual predecessors and teachers, Jain gurus and arhats doubtless, of some local consideration. He makes himself the 3rd descendant, the pupil of Shri Kamalkirti Deva, who was the grandfather of Rayavudie, and pupil of Shri Hemakirti, and he again of Shri Kshemakirti. The matter worthy of note in these is the term kirti, a very usual title of Digambara Jats, which I have in another place supposed the Indrajit Jains to be. After them follow a list of local gurus who assisted in consecrating and in the daily worship of the image of Indrajit. The paleography of the appellation, the affix of the word Jain to it, and its application to a figure, is singular, equally is its having been preserved unchangeable contrary to the habit of the Jains, who are whimsical in these matters. Were Indra the deity invoked it would not be surprising, but there is no trace whatever of an image of him; none certainly in a posture of adoration, or as Dvarapals, the position and place assigned to the devatas, brahman and other wise men which the Jains acknowledge. That they recognise deities of the

brahmans is notorious, but they are subordinate not principal ones, even Brahma and Maheswara are at present deities but inferior in rank and power to Indra, who is considered "the chief of all the happy beings that reside in Swarga;" by the Jains termed Sukko or Sakkec (mighty) and worshipped by prayer and offerings of fruits and flowers, and he is a favorite presiding deity, but not solitary, there being 64 Indras, two of whom govern one of their classes, the Bhawanipratis. Indra is also worshipped in his character as the regent of a quarter, and the Rahtores of Canouj are said to have sprung from the back-bone of one (Col. Sykes). We might thus easily be prepared for the name of Indra, and attach a modern source to it, but here we have the name not of Indra, but of the figurative conqueror of Indra, Indrajit, the son of Rávana, the Meghanáda, so renowned in the wars of Ráma, preserved for three centuries in the records of the temple, and applied not only to the temples, but also to a figure, the object of worship, and how one of the Tirthankaras would have got the surname of Indrajit it is difficult to say, unless as in Meghanáda's case, the term is used metaphorically as an attribute of great power, which I take to be the true rationaal of the term for Rávana, king of the Rakshasas, is said to have worshipped the image of Gomat Iswara at Beligula, but at Báwangaj his son Indrajit is made a devata and himself worshipped, a manifest contradiction, and we find a temple at Woon bearing the very same name. Enpassant, I may remark the very strong affinity between the Jain structures at Báwangaj and Woon, a similarity extending to the date, name and isolated figures, which will form the subject of another paper. The orthography of the word उलद्रतति scarcely permits a resolution into its component parts, which but for its established meaning and historical reference might be attempted. For instance, Indra and Ajet referring to the 3rd Tirthankara, and written without the medial, but against any such corruption is the distinct affix जात *játi* to शक्र *Sakra*, and सुरपती *Surapati*, names of Indra decisive, I think that Indra and not Ajit is the deity meant, otherwise Indra's names would be separate and other appelation Ajetha given. The most important inscription which I myself met with at Báwangaj was a small one upon the Nokar foot of an image of Parswinath, found near the large figure, and which I brought away with me, and have appended to the others. For some time I was baffled by it, but the Rev. Dr. Wilson, to whom I feel under great

obligation for much valuable instruction and assistance, and the decipherment and translation of this, at once recognised the Pali form of many of the letters and expressions, which is an important fact, as it implies, from the more ancient form of the language, a more remote and older date for the images than that in which the temple inscriptions are. Kantharanatha is either a name of Párswanath, meant for Kuntee, Chaturrahati is the Pali form of the Sanskrit Chatur Vinshati (24). Saka Sala, of the Sanskrit Shaka Shala, and Panati of Pranati. The second letter of the group is a very difficult one. Dr. Wilson found it to correspond with an inscription in his private collection from Abu, as also the form of the ए, which the Jains write with a terminating stroke to the left like ru.

The most interesting letter is perhaps the ह hu, in the second line, which is conformable with the Gujerat character of the 2nd century.

The stone is a close-grained dark limestone, whether found in situ near the Nerbudda I cannot say, but probably not far from Barwáni. It seems the same formation in which Dr. Leith has discovered fossils in, and which is to be seen in the island of Bombay, on the other side of the causeway, at the breach, but less slatey. The meeting with it 350 miles inland on the other side of probably the same basaltic overflow with which it is connected here, is a coincidence which may prove of geological as well as historical moment. The temple itself requires short notice. In structure it is so decidedly modern from the repairs it has undergone, that little can be elicited regarding its original form; at present it can scarcely come under any denomination of temple, but that of misra, mixed, a term having reference to the materials with which it is built.

The oldest Jain temples in India, as Behar, Abu and Girnar, have a large dome in the centre, and occasionally smaller ones in the corners, some have pyramidal spires, as in Nimar Guyt, and Siam, where the building over the Prabhat is especially described as pyramidal; but there is only one flat one that I am aware of—the temple to Parswinath, half way down the mountain of Samet Sikhar. The circular frustrum still remaining at the Báwangaj temple, over which the modern dome has been placed, might lead to the supposition that the sanctuary and vestibule were included in a vaulted roof, as with the temple of Kamalmair in Rajpootana. The Garbha Gribá or chief body of the temple is flat

and does not look as if it had been disturbed, and may have been flat originally. In other respects the temple was the usual vestibule and mindra, but no semblance of a colonade or porch. The pillars nearly all differ; they are small, six feet eight inches only in height, light and tapering and devoid of much ornament, but this, with their projections on the shaft and bracket-shaped capitals, only attest their antiquity.

It is remarkable though not rare that the Paduká or feet-worship which extends over such an immense tract of country,—Ceylon, Malwa, Siam, Ava, and Behar, should be discovered on a solitary mountain in the centre of India, and speaks much for the uniformity of the religion, whether in its primitive form of Buddhism or that of the succeeding faith of the Jains, but it is, I fancy, less reverently adored than among the Siamese, where the Paduká are covered with water for the devotees to sprinkle and wash away the stain of sin,—a potency not admitted by the Jains in central India.

Those at Báwangaj are probably emblematical of Mahávira, to whom such are generally attributed,—the only exception which I know being some to Vasupujya, in a temple at Carbirpur near Chámpánagar in Behar, and to Parsvanath at Samet Sikhar. There is an annual Tirtha to Báwangaj, most likely the feast of the Pajjusan or Paryushana, but of the season of it I have no note, nor whether it is kept in conformity with that festival in respect to religious meditation, fasting and reading. I believe the assemblance of Srawacs at this season is large, from Mandissura, Rattam and all the large mercantile towns in central India, and I think there must exist, or have in former times existed, some caves or buildings for them to assemble in which may yet be ascertained, for the country is quite barren. Neither at the summit of the hills, nor on the road at the foot, is there any water or shelter for devotees, nor yet any building. It may not be uninteresting, and perhaps prove of utility, if I describe the road and means of access to Báwangaj and its figure. Taking Mhow as a starting point, there are two roads, one ninety and the other one hundred and nine miles long, each having its advantages; the first and shortest is by Akbarpur and the Nerbudda, and is that most likely to be taken by a traveller going towards the provinces. The distances are—from Mhow to Akbarpur, on the Nerbudda, 39 miles, from this to Chakulda, 44 miles, but by water somewhat less. I performed it in about 20 hours, going with the stream, but

sleeping during the night drawn up upon a sand bank. From Chakulda on the right bank to Báwangaj temple, is about 8 miles, including the crossing of the river. The only benefit in travelling this road is the celerity with which you can get over the ground, it being the high road between Agra and Bombay as far as Akberpur. Beyond this it is a matter of choice whether the land route be taken viâ Dharampurí and Bicaneer, or the water. At one of the bungalows, Googree, below the ghats, a stroll of 100 paces round the building amply repays the traveller in the innumerable specimens of lucustrine deposits, principally shells scattered curiously enough loosely over the surface, as if left there by receding water, and in profusion. The Nerbudda presents of course its own peculiarities, but beyond these there is little to attract attention. The other road is longer but full of interest almost all the way. Thirty-one miles distant is Dhar, the reputed capital of the Pramara dynasty, now on the wane, but which has preserved its name and site if nothing else, for nearly 10 centuries. On every side are tombs, musjids and palaces, evidences of the Mahomedan invaders, but now and for some time past falling fast into ruin, and being hourly despoiled to furnish materials for Brahminical temples, in return no doubt for a like compliment paid the Hindus by Dilawar Khan Ghori in 1387. We may say with no irreverence here :—" Sic transit gloria mundi." Baug, 48 miles distant on the direct road, but below the ghats, furnishes its caves, the only purely Buddhistical ones hitherto found in central India, so long the seat of Buddhistical rule, and its invariable associate, paramount religious influence. Hence to Chakulda there is nothing of interest, and there merely a bungalow, from which Báwangaj temple can be both seen and visited, and from which it bears about 13° south-west. There being no water or shelter on the hill, must be returned to daily. It is open to the traveller to return by either route, but perhaps wiser to descend than to ascend the stream.

Translation of the inscription on a piece of stone on the eastern side of the temple.

May Rámachandra Muni, who is the receptacle of virtues, who is blessed with wealth, whose feet are adored by the circle of the lords of the earth ; whose fame is as white as the moon, the kunda flower and snow,

whose fame is represented by the temple of Indrajit Jain,* whose fame has reached the points of the highest mountains on earth, whose fame is the greatest on the face of the earth, whose fame has in consequence of the great crowd of people on the surface of the earth gone to the sun to be crowned with success.

Dated Friday, the 14th Bhadrapad vud, Samvat 1223.

Translation of the inscription on a piece of stone on the southern side of the temple.

I make my obeisance to him who has subdued his passions.

May Rámachandra Muni, who has had the beautiful temple of Surapatijit† built.

Who has brought all the science to light, whose fame travels all over the earth, who has renounced all evil passions, whose mind is developed by knowledge, who is revered by persons making Tapascharya, who is possessed of all the virtues, who is a descendant of the family of Shrí Devánanda Muní, the receptacle of religious knowledge, and Tapascharya, the abode of the qualities possessed by *Yatis;* the treasure of good sayings, the leader of all the assemblages of Sidhas, and who was the pupil of Lokánandamuni, the lion for destroying the elephant, consisting of the sins prevailing in the Kali Yug, and whose feet were kissed by the crown of VAIN, the Lord of the earth,—be crowned with success.

Samvat 1223.

Translation of the inscription on the gate of the temple.

On the auspicious day of the 1st Mrigashirsha vadi, Samvat 1516, and during the reign of Mahmood, of the Soorsheida family, when the Shríkashtha‡ Singh, was prepared to proceed to Muttra and Pushkar, Shrí Ratnakirti, who has crossed the ocean of committing to memory the principles of the Jain religion. Who makes mental devotion. Who is the leader of the circle of Sidhas, and who is the pupil of Shrí Kamalakirti Dev, who was the chief of the speakers on the subject of the great dispute, who was the grandfather of Rayavadí, who was the leader of the circle of learned men, who

* Shukrajit in the inscription. † Indrajit.

‡ A particular assemblage of pilgrims.

was the pupil of the most respected Shrí Hemakirti Deva, who observed all the Vratas, who constantly read the religious works, who made Tapascharya, who had curbed the passions, and who was the pupil of the most respected Shrí Kshemakirti Deva, repaired the large Jaina temple.

Parashrí Dashji, Navashutikágár, Kahapita Bhuderur, Dnyatyusura, Daloobharya, Khetu *alias* Padmini; Khetoo's son, by name Vadha, and Parus, have consecrated the image of Indrajit, and daily worship it; may this assemblage be happy.

Translation of the inscription on a piece of stone on the northern side of the temple. In Samvat 1516 * * * repaired (the temple.)

Translation of the inscription on a piece of stone on the western side of the temple. Acharya Shrí Ratnakirti Pandit Pahoo.

Translation of an inscription on a pillar within the temple and near the gate.

Jogi Jangam * * * Maga.

The name of the artist is unintelligible. In Roman characters it is *S*ilpa Nága Sutra Sálá—*S*illupa dala Shutra *S*álá.

On the east side of the temple.

यस्य स्वजतुषारकुन्दविशदा कीर्तिर्गुणानां निधिः श्रीमान् भूपतिवृन्द-वन्दितपदः श्रीरामचन्द्रो मुनिः। विश्वक्ष्माभृदखर्वशेखरशिखासञ्चारिणी ह्यारिणी उर्व्यां शत्रुजितोजिनस्य भवनव्याजेन विस्फूर्जति ॥ १ । रामच-न्द्रमुनेः कीर्तिः सङ्कीर्णं भुवनं किल। अनेकलोकसङ्घर्षाद्गता सवितु रन्तिकं॥ संवत् १२२३ वर्षे भाद्रपदवदि १४ शुक्रवार ।

On the south side of the temple.

ॐ नमोवीतरागाय॥ आसीद्यः कलिकालकल्मषकरिध्वंसैककंठीरवो वेनक्ष्मापतिमौलिचुम्बितपदः यो लोकनंदो मुनिः। शिष्यस्तस्य ससर्वसङ्घ-तिलकः श्रीदेवनन्दोमुनिः धर्मज्ञानतपोनिधिर्यतिगुणग्रामः सुवाचां निधिः॥ १ ॥ वंशे तस्मिन् विपुलतपसां सम्मतः सत्त्वनिष्ठो वृत्तिं पापां विमलमनसा त्यज्यविद्याविवेकः। रम्यं हर्म्यं सुरपतिजितः कारितं येन विद्या शेषा कीर्तिं भ्रमति भुवने रामचन्द्रः सएषः॥ संवत् १२२३ वर्षे।

On the gate of the temple.

स्वस्ति श्रीसंवत्१५१६वर्षे मार्गशीर्षवदि ६ रवौ सूरसेनमेहमुन्दराज्यश्री काष्ठासङ्घे माथुरगच्छे पुष्करगणे भट्टारकः श्रीश्रीक्षेमकीर्त्तिदेवः व्रत-नियमस्वाध्यायानुष्ठानतपोपशमैकनियमभट्टारकश्रीहेमकीर्तिदेवसच्छि ष्य महावादवादीश्वर रायवादीपितामहसकलविद्वज्जनचक्रवर्त्ति-नलः श्रीकमलकीर्तिदेवा सच्छिष्यजिनसिद्धान्तपाठपयोधिनायकान्तरो-पासीन मण्डलाचार्यश्रीरत्नकीर्त्तिना जीर्णोद्धारः कृतः बृहच्चैत्यालयपा-र्श्वे दशजिनवशतिकाहा कारोपीता भट्टेश्वर द्वितीयसं डालुभार्य्याखेतु द्वि ना पद्मिनी खेतुपुत्रसं० वाछासं० पारस एतैः इन्द्रजितः प्रतिमां प्रतिष्ठाप्य नित्यमर्चयन्तो पूजयन्तोवा शुभंतावच्छ्रीसङ्घस्य।

On the north side of the temple.

संवत् १५ १६ वर्षे शिल्पनागसुतरसालाशिलपडाला सूत्रशालाजी-र्णोयतः।

On the west side of the temple.

आचार्यश्रीरत्नकीर्तिपंडितपाञ्च।

On the pillar of the gate of the temple.

जोगीजंगमयाउसजोतराउल।

From the foot of the statue.

कण्ठरनाथसाधु
चतुर विहतिहिलि
साकसाला हइ प्रणति

Kantharanátha Sádhú.
Cháturvíhatí hí—li.
Sáka Sálá haí pranati.

Remarks on the Snow Line in the Himalaya.—By Captain THOMAS HUTTON.

In the Journal of the Asiatic Society, No. 202, for April 1849, are some remarks on the snow line in the Himalaya, from the pen of Lt. R. Strachey of the Engineers, wherein he endeavours to prove that the observations some years since made by myself and others in the northern tracts of the Western mountains, are erroneous.—[As it appears to me that this gentleman has actually left the question where he found it, I might have been induced to pass by his remarks without notice, had he not in the excitement of an imaginary triumph, thought proper to indulge in a somewhat satirical tone of condemnation].

That Lt. Strachey, after three or four years of scientific researches, has at length been enabled fully to *corroborate* the previous observations of Webb and others in Kumaon, there is no denying,—but as the truth of those observations when applied to that neighbourhood, was never called in question, there appears to have been a waste of time and ingenuity on a laborious endeavour to prove that which was already admitted to be an established fact.—Webb, Hodgson, Colebrooke and the Gerards, are each and all reviewed and in some measure found wanting, and pronounced to be ignorant alike of the true meaning of "the snow line,"—and of the nature of "a glacier;"—shall I then desire a better fate than to be condemned in the company of such arrant *ignoramuses?*

Had Lt. Strachey evinced *more* real anxiety to ascertain and establish,—not a local,—but the general truth,—and *less* proneness to indulge in censure, he might have gathered from my letters in the Calcutta Journal of Natural History, that no attempt was made either by me or by those gentlemen whose opinions and observations corroborated mine,—to refute the facts which Webb and others had observed in Kumaon, but that on the contrary while we admitted those facts to be true, we still thought we saw reason to conclude from what had been witnessed in other parts of the mountains, that they could be regarded only as locally and not generally true.

With regard then to the actual point in dispute, Lt. Strachey has done nothing;—for to prove that his imaginary opponents were wrong, he would have collected his data from the districts in which their ob-

servation were made;—yet, while confidently pronouncing them to be in error,—he ingenuously informs us that he never was in those districts!*

What then is the true value of his assertions and assumptions? Does he imagine that the scientific world will be content to accept his unsupported '*ipse dixit*' in preference to the actual observations of four independent inquirers, each of whom is fully as competent as himself to judge of what he sees?—Did it never occur to him that, that which may be *locally true* in one district is not necessarily true in general when applied to the whole extent of the Himalayan range?—Into some such error did Werner fall when he regarded the geological facts of a limited German district, as an epitome of the geology of the entire globe; and if men are wilfully determined to look no farther than the length of their own noses, such errors must needs be frequent and unavoidable.

The first objection made to my views arises evidently from my opponent's ignorance of the localities spoken of,—he, according to his own acknowledgment in a note at p. 297 of the Journal above mentioned, distinctly stating that *he never was there himself!* Yet he does not hesitate to *assume,* that "the true Himalaya," of which I wrote, was the Bissehir or Southern Snowy range.—Had he possessed any personal knowledge of the country over which I had travelled, he would have seen that all the Passes mentioned in my letters, were situated *beyond* that range and to the north of it,—while, since he admits that "the mountains on which perpetual (?) snow is found, all lie between the 30th and 32nd degree of north latitude,"—a glance at his map would have shown him that the locality of my observations is situated between 31° 30′ and 32°, or as completely beyond the Bissehir range, as his own locality is north of Kumaon.

In regard to the mistakes into which I am stated to have fallen, in confounding "the north and south aspects *of the individual ridges* with the north and south aspects of *the chain,*"—I have to observe that the mistake is due rather to my readers than to myself, for in stating that "dense forests and vegetation occur along the southern

* Lieut. Strachey has quoted Captain Cunningham's remarks as confirmative of his own opinions, but the latter gentleman, in a recent paper, appears to plead "not guilty"—to the soft impeachment!

slopes, while they are nearly altogether wanting on the northern *face,*" —it is evident that I referred to the true north and south aspects of *the chain ;*—whereas my opponents chose to imagine that I referred "to the north and south aspects of individual ridges ;"—hence Mr. Batten's objections at page 384 of No. 19 of Calcutta Journal of Natural History, where that gentleman says,—he is "convinced that Captain Hutton confounds the singular with the plural number! viz, slope with slopes."—Had he been kind enough to imagine that it was just within the bounds of possibility that the final *s* was a slip of the pen,—he would have been much nearer the truth.—Indeed, he might have seen that such was the case from the immediately subsequent mention of "the northern *face,*" in the singular, as contrasted with "the southern *slopes.*"

But although Lt. Strachey has deemed it necessary to lay such stress upon what he imagines to be a grave error,—it is remarkable that he has studiously abstained from accepting the explanation of my meaning, given at p. 380 of *the same number* of that Journal, in these words,—"Captain Jack objects to my stating that 'dense forests and vegetation occur along the southern slopes, while they are nearly altogether wanting on the northern face ;'—in making this statement, I referred, *not* to the southern slopes of secondary or minor ranges on the Cis-Himalayan aspect, *but* to the fact,—that forests and dense vegetation are found *on the south of the principal chain or true Himalaya,* —while on the northern aspect of that great range they are nearly altogether wanting.—This assertion will, I doubt not, be borne out by every one who has crossed into Tartary ; for while to the south of the great chain, we find superb and stately forests,—on the north there is scarcely a tree to be seen, and the few that are occasionally met with, are either stunted cypresses growing in the moist soil of ravines, or poplars planted round a village by the hand of man, for economical purposes."

Now, as a mathematician, my opponent should have known that when a man assumes his own data, he ought to be able to prove anything he likes ; and assuredly he is bound to establish the point for which he is contending : yet acting on this principle he has somehow only contrived to prove himself in error,—for, knowing nothing of the western Himalaya, and *assuming* that I mean one thing, when I have

distinctly stated that I mean another,—he proceeds to draw conclusions which will not bear a moment's examination. Had he before passing sentence of condemnation, bent his footsteps towards the upper parts of Kunawur, he would have found that forests *are not wanting to the north of the Bissehir range*, and consequently that my remarks could not apply *to it* as the water-shed.—It is not until the traveller surmounts the passes which lead from upper Kunawur into the Tartar districts, that he beholds on the one hand a wooded country and on the other a comparatively barren waste, and when he has consequently placed nearly the whole of Kunawur between himself and the Bissehir range to the south.

"The doctrine," says Lieut. Strachey, "which Capt. Hutton attacks as erroneous, undoubtedly is so. But it is a doctrine that was never inculcated by any one. Capt. Hutton having misunderstood the true enunciation of a proposition, reproduces it according to his own mistaken views, and then destroys the phantom that he has raised."—With all due deference to Lieut. Strachey, he must permit me to remind him that *assertion*, however confidently made,—is neither proof nor argument, and that the doctrine to which I alluded *did exist*, may be gathered from Captain Jack's letter in No. 15, p. 458 of the Calcutta Journal of Natural History, and likewise from Dr. Lord's remarks on the Hindu Kush,* which by the way Lieut. Strachey does not deem it safe to comment upon! Moreover, "*the phantom*" which I and my supporters destroyed, was neither more nor less than this,—that whereas the common doctrine assigned *as an universal rule*, a lower elevation to the southern snow line than to the northern, we showed that it was only *partially* and *not universally* applicable. Lieut. Strachey however, having rejected the explanation of my meaning, as well as everything tending to militate against his own preconceived notions, and having himself misunderstood the true enunciation *of my proposition*, denies to his opponents the right of crediting the evidence of their senses, and leads them to infer that he is unwilling to admit the truth of any fact which he cannot actually see. The erroneous idea, which he has imbibed, that the Bissehir range is *my* true Himalaya, as he loves to call it,—is founded on an

* Cal. J. Nat. Hist. No. 14, p. 276.

assumption arising solely from his total want of knowledge of the localities in which my observations were made.

In quoting from Captain Cunningham's letters to me, Lieut. Strachey is careful to extract only so much as may tend to corroborate his own views; but in theorising on the probable causes which tend to accumulate a greater quantity of snow on the southern than on the northern aspect, and which he thinks he finds in the sudden congelation of moisture-bearing winds from the south, he is pleased altogether to disregard Captain Cunningham's observation that it is the violence of this same southerly wind which actually keeps the southern slopes of Tartary *free from snow*, and that too at all times.

Contrary to all Lieut. Strachey's views and theories, we find Capt. Cunningham writing from Tartar districts that,—"in January and February, and indeed *at all times*, the violent southerly winds kept southern exposures *free from snow;*"—again he says, "no snow whatever *on southern slopes* within 15 to 16,000 feet; but *on northern slopes* and in hollows, *abundance of snow.*" Again—"February 10th and 11th.—In getting up *the northern slopes*, the snow was, *I don't know how deep!* On reaching the summit of a pass I found no snow, nor did I find any *on the southern slopes*, except in hollow portions or tolerably flat bits.—The highest pass on the road is perhaps 13,500, or nearly 14,000 feet."—[This too, be it remembered, in notoriously the severest month of winter, in these hills!] "The effect," he continues, "is attributable partly to the violent southerly winds which blow during December, January and February, and partly to the sun's rays. In the beginning of May, in coming from Nako to Chungo in Hungrung, I found *no snow* on the *southern, eastern or western slopes;* but on some *northern ones* which were steep, *there was snow three and four feet thick;* elevation about 11,500 feet. At Shalkur up to the middle of June, the snow lay *on the northern sides* of the gullies or ravines of the hills; and when out shooting I had much difficulty in crossing them; elevation 11,000 to 11,500 feet.—I was informed also that *the northern slopes* of the Hungrung ghat, between Soongnum and Hungo, had some snow until the middle of June. *On the southern* face it had melted *six weeks before*, except in hollow places." And finally, "August 7th.—There is no snow on western slopes of hills 17,000 feet high, but *there are a few patches on the northern slopes.*"

Thus we have observations made in Tartar regions north of the Bissehir range, between 31° 30′ and 32° north latitude, all of which tend directly to prove that while from December to August snow was always to be found on the northern aspect of every hill or range, there was either little or none at all on their southern exposure.

What, then, has Lieut. Strachey proved by his observations in Kumaon, and by his strictures upon nearly every one who has written on the subject of the snow line in the Himalaya? We appear to be indebted to him simply for proving what was never disputed, namely, that the facts observed by Webb and others in Kumaon are true, as far as regards that district; but with respect to the only point in dispute, namely, as to whether those facts are only locally and not generally true, he has left the question exactly where he found it. Indeed, his *assumption* that my observations were confined to the Bissehir range, in spite of my declaration to the contrary, proves at once that his efforts have been less directed to the elucidation of the truth, than to my personal discomfiture.

But conceding even that the Bissehir or southern snowy range was the locality on which my facts were observed, there still appears strong reason for asserting that the phenomena there visible are directly opposed to the conclusions which my opponent would draw from them; for he declares that a greater quantity of snow must fall on the outer southern face of the range, owing to the intercception of heated and moisture-bearing winds from the south, and thus he would account for the prevalence of the snow on that aspect. Supposing then, for the sake of argument, that thus far his views are just, when applied to the southern range of Kumaon, he has still chosen to overlook the fact that in Lord and Gerard's "Tours in the Himalaya,"—a work too, which he has himself quoted,—it is stated that "the line (of perpetual snow) in the latitude 30° 30′ in Asia is fixable at 15,000 feet on the southern or Indian aspect of the Himalaya mountains, and on the northern (not the Tartaric) may be concluded at 14,500 feet."—This appears to me to give the northern snow line of the outer range an elevation less by 500 feet, than the southern one; while Captain Cunningham in a recent paper, even estimates the approximate difference at 3,000 feet.*—The same gentleman likewise states that—"on the

* J. A. S. No. 205, p. 695, for 1849.

Tibetan side of the chain the (approximate) heights will be found to be 20,000 feet on the south, and 18,000 to 18,500 feet on the north face of the same hill."—These observations then appear to establish the fact that from the southern snowy range to the northern or Tibetan one, the snow line is always, on every hill or range, the outer ones inclusive, at a lower elevation on the northern than on the southern *slopes.*

But Gerard proceeds to tell us, that "the cheeks (of the Borendo pass, on the Bissehir range) are perfectly naked long before this time of the year (August 1822,) and the trough formed by them, although sheeted with snow at the summer solstice, is now (August) bare rock down to the ravine *on the south side*, with the exception of some accumulations, which will be very much diminished before another month; and some seasons, as in the former (1821.) *the whole face of the declivity without a patch of snow.* On the north, *there lies a vast field which never dissolves.*"*

So again, Captain Jack says,—"I crossed the Borendo ghat on the 25th September 1842, and *there was no snow at all on the southern aspect*, or on the very summit of the pass; but descending a few yards *on the northern aspect* to the base of a rock which was nearly perpendicular, we had the pleasure of seeing our baggage, coolies, &c. decending most rapidly by their own gravity *upon an unbroken bed of snow extending* 250 *to* 300 *yards in one slope*, forming an angle of about 45°."

Here then, we have different observers in different years proving that on the Bissehir range, the snow lies deeply and extensively *on its northern face*, even when there *is none on the southern aspect;* we have consequently the very same phenomena apparent, from the outer snowy range up to the northernmost one, proving that the local facts of Kumaon are *not facts* in the western parts of the Himalaya, and showing moreover, since the true southern aspect of *the chain* becomes denuded of snow,—that while there is a snow line on the northern or Tibetan aspect, there is no permanent snow line on the southern face of the Bisschir range.

It is however due to my opponent to state, that I am not aware that the elevation of the passes on the Bissehir range have ever been correctly ascertained, for although Dr. Gerard has somewhere stated the

† Loyd and Gerard's tours in the Himalaya, p. 327.

cheeks of the Borendo pass to be upwards of 16,000 feet, yet the truth of that measurement has been since called in question. It may therefore eventually be found that the elevation of that pass is below the snow line, which would account for the disappearance of the snow from the southern aspect. I am quite willing then to give Lieut. Strachey the benefit of the doubt; while at the same time should I be driven from my position in Bissehir, I shall still take my stand with Dr. Lord, on the Hindu Cush, and maintain, (which is in fact the only point for which I have really contended) that the doctrine on which Humboldt relied as applicable to the whole extent of the Himalaya,—cannot be so accepted.—Feeling satisfied that he had discomfited all former observers in India, and thus converted his local into general facts, Lieut. Strachey next proceeds to run a tilt with Humboldt himself, who had accounted for the greater elevation of the snow line on the north of Kumaon, by supposing that the radiation of heat from the plains of Tibet contributed mainly to produce that effect. With this very simple and natural inference, our author is dissatisfied, and he "therefore attempts to supplant it with a theory of his own. He says, that as radiation from the plains of Tibet *does not* produce the greater elevation of the northern snow line, that effect must be occasioned by the diminished quantity of snow that falls on the northern, as compared to the southern part of the chain." Now this, if it be intended to apply likewise to the district of Bissehir, becomes a perfect riddle, for if less snow falls on the north than on the south, how is it that there is always snow on the northern long after it has disappeared from the southern aspects of the higher ranges of the western tracts? Are we to believe that the greater the quantity, the sooner it melts?

Even if restricted to the neighbourhood of Kumaon, the theory would be totally unsatisfactory, for the small quantity of snow on the north, if not acted on by radiation of heat from the plains of Tibet, nor melted by the rains of the monsoon, would last at the very least as long as double the quantity on the southern slope, where it is exposed both to the direct rays of the sun and to the destructive influence of the heavy periodical rains; and this appears to be very satisfactorily proved by Lieut. Strachey's own remarks on the black range, which rising immediately from the plains of Tibet, retains snow on its northern aspect when there is none whatever on the south.—But when to the

effects of the above agents we add the fact that the violent southerly winds of winter have a tendency to keep the southern slopes free from snow and to accumulate it in drift on the north, we appear to have every fact leading to the conclusion that the snow will, as a general rule, be found longer and deeper on the north than on the south; and Captain Cunningham has stated that when (even in winter) there was little or no snow on southern aspects, it was sometimes "*four feet thick*" on the north!

The very admission therefore that the northern destructive agents exert little influence on the snow, would of itself be sufficient to overthrow thus much of Lieut. Strachey's theory; for if those agents which drive the snow to a certain elevation are removed, it is evident that the snow, whether much or little, must remain nearly or altogether intact.

We are further told that, "the air that comes up from the south, no sooner reaches the southern boundary of the left of perpetual snow, where the mountains suddenly rise from an average of perhaps 8,000 or 10,000 feet, to nearly, 19,000 or 20,000, than it is deprived of a very large proportion of its moisture, which is converted into cloud, rains or snow, according to circumstances.—And the current in its progress to the north, will be incapable of carrying with it more moisture than is allowed by the very low temperature to which the air is of necessity reduced in surmounting the snowy barrier, 19,000 or 20,000 feet in altitude, that it has to pass. Nor can any further condensation be expected at all comparable in amount to what has already taken place, as it would manifestly demand a much more than corresponding depression of temperature; and this is not at all likely to occur, for the most elevated peaks being situated near the southern limit of perpetual snow, the current on passing them will more probably meet with hotter than with colder air."

I must confess that this theory does not appear to me to be either conclusive or even probable; for in the first place, we are neither furnished with any *proof* that the air will be *hotter* to the *north* of the high peaks, nor with any approach to data for determining the question; the whole resting upon the unauthorised *assumption* of a *desired fact*, the existence of which is absolutely necessary to give anything like validity to the theory.

Were the upward or northward passage of the moist air effected slowly and gently, no doubt we might expect a heavier fall of snow on the southern aspect of the chain, *provided always* the temperature beyond it was, as Lieut. Strachey supposes, *hotter* than on the Indian side; but *this is not the case*, as is most convincingly proved by the admission that snow always lies longer on the northern aspects *of all hills and ranges*, than on the south, and I need only cite Lieut. Strachey's own black range as an instance of the fact.—He likewise admits that "southerly winds blow throughout the year over the Himalaya," and "in the winter," which is of course the season of snow, "*with the peculiar violence.*" This is recorded also by Gerard and by Captain Cunningham, and every traveller can confirm the same. But this very violence of the southern winds must necessarily carry the snow across the southern range and accumulate it deeply to the north, and this is clearly shown to be the case by Captain Cunningham, who relates that while during winter and "indeed at all times, the violent southerly winds kept southern exposures *free from snow*"—"*on the north it was I don't know how deep.*" Moreover, if the temperature of the air was hotter to the north than to the south of the high peaks, we ought as we approach the plains of Tibet to find no snow on the northernmost range; yet the black range, rising from those plains retains the snow on the northern even when there is none on the southern slope,—a fact which, while it militates strongly against Lieut. Strachey's views, tends much to corroborate Captain Cunningham's observations. But granting that Lieut. Strachey were correct in these particulars, does it necessarily follow that what is fact in the neighbourhood of Kumaon, may not be pure fiction when applied to the western tracts? Can the assumptions of one who confesses that he never set foot within the limits of the district where his opponent's observations were made, in any way affect those observations? He is evidently disposed to disregard the question of one of his own supporters, who asks—"how can any facts of one observer in one place falsify the facts of another observer in another place?"* Now I and my supporters have long since received Captain Webb's Kumaon facts *as true*, when applied to the places wherein he observed

* Cal. Journ. Nat. Hist. No. 19, p. 383.

them, and we merely in return claim the right of believing the evidence of our own senses, when wandering over other tracts of the Himalaya.

I repeat then, that as far as the evidence yet goes, the phenomena observable in Kumaon are opposed to those which have been observed to the westward,—and in rejecting Lieut. Strachey's theory as insufficient, I much prefer adhering to Humboldt's until a better is offered. Lieut. Strachey denies that the radiation of heat from the plains of Tibet exercises any but a trifling influence on the snows of the northern aspect; still his denial rests on no better basis than that of an assumption, for no proof whatever is produced in support of the opinion, save that there is snow on the Tibetan face of the black range, when there is none on the southern face.—But this is really nothing to the purpose, for it merely shows that the direct rays of the southern sun, united to the greater humidity of the atmosphere, and the effects of the violent southerly winds, have a far more powerful effect in uncovering the southern aspect, than the heat from the plains of Tibet has upon the snow of the north. The true question however does not relate to the north and south aspect of the black range, but to the aspects of the water-shed; and in regard to it we are told that while on the south the snow line is about 15,000 or 15,500 feet, on the north it is 18,000 to 19,000 feet. Now the height of the northern ranges above the plains of Tibet does not appear, on an average, to be more than 3,000 to 8,000 feet, if so much; while on the south, the peaks rise to 16,000 and 18,000 feet above the plains of India, from which moreover they are separated by a broad intervening belt of wooded mountains, averaging from 6,000 to 8,000 feet above those plains. Consequently it does not appear very difficult to perceive that radiation from the northern plains, must affect the snow more powerfully than from the southern plains, and will drive the snow line to a greater elevation *above the sea* on the northern, than on the southern aspect. Thus Humboldt's theory when applied to the Kumaon and other similar districts, appears to be perfectly correct. But that the physical features of the Kumaon and western tracts are at the antipodes of each other, has been plainly stated by Mr. Batten, who says—"our passes *at once* take us into Tibet, and do not conduct us like those beyond Simlah, into an intermediate and peculiar track, like Kuna-

wur."* Now it seems to me by no means improbable that this very difference in the features of the two tracts may be sufficient to account for the difference in the phenomena observable in each, and that if Humboldt's theory of radiation from the plains of Tibet is sufficient to account for the retreat of the snow to the heights of the northern face, the want of similar plains† in the western tracts will of course preclude such radiation from acting on the northern face of the western mountains, and thus the greater heat of the southern side, added to the periodical rains and to the violence of the winds in winter, will leave snow on the northern long after it has disappeared from the southern aspect.

Lieut. Strachey admits that the rains have a powerful effect in melting the snows, but his want of knowledge of the localities to the westward has led him into an error when he supposes that the monsoon does "not extend up the Sutlej beyond the point where the Buspa falls into it;" the truth being that Chini, which is itself farther up and situated in the gorge where the Sutlej breaks through the outer snowy range, is full within the monsoon, as both Captain Jack and I experienced; beyond this point the rains are light and uncertain, but they nevertheless extend to the head of the district, for clouds and vapours pass onwards through the valley of the Sutlej even to the upper parts of Kunawur, and exercise great influence in clearing the southern slopes of their snow; and although Lieut. Strachey has *assumed* that clouds protect the snow, by warding off the direct rays of the sun, he overlooks the fact that such clouds betoken a humid atmosphere, which is quite as inimical to the duration of the snow as the sun's rays, and he might at least during his scientific researches in Kumaon, have learnt the fact that thaws are more rapid in cloudy weather, than in a dry and unclouded atmosphere, such as that which he acknowledges to be the general characteristic of the northern aspect.

Dr. Lord's remarks on the Hindu Cush coincide apparently with mine to the north of the Bissehir range, and since Webb's observations in Kumaon are found to be only locally true, there can be little doubt

* Cal. Journ. Nat. Hist. No. 19.

† Captain Cunningham seems to doubt the existence of any plains at all!—Vide J. A. S. 205, for 1849.

that Dr. Lord's surmise relative to the effect of heat radiating from the high plains of Cabul and Koh-i-damun is correct.

In regard to "*perpetual snow,*" Lieut. Strachey has rightly understood me, and I again repeat that *there is not* and *cannot be* any such thing, and that any assertion to the contrary must necessarily convict its author of being utterly ignorant of the well known fact, that nothing in nature is perpetual or everlasting. All matter is ever undergoing change; the very rocks are crumbling down beneath the force of atmospheric agents; the atmosphere itself is constantly undergoing change and renovation; the water and the snow alike return to it in the form of vapour. Where then is there a sign of perpetuity? My opponent should have remembered, when he undertook to censure my supposed illogical reasoning, that there is a wide difference between a hill covered with *perpetual snow*, and one that is *perpetually covered* with snow!—"The mere continuance of snow on any spot," says no less authority than Professor Forbes, "does not suppose that snow never melts there; were that the case a progressive and unceasing accumulation would be the result; the position of the *snow-line*, or what is often erroneously called *the line of perpetual congelation*, is determined solely by this circumstance, that during one complete revolution of the seasons or in the course of one year, the snow which falls *is just melted and no more.*"*

Thus Lieut. Strachey's observations, although useful in corroborating those of Webb and others, in reality leave the question precisely where it was, namely, that while in Kumaon the elevation of the snow line is greater on the northern aspect than on the southern; the truth, on the Hindu Cush, and as far as observation goes, in the Tartar districts north of the Bissehir range, is actually the reverse; proving as I long since stated, and now repeat, that the facts on which Humboldt relied as applicable to the whole extent of the Himalaya, are found to be purely local, and dependent altogether on the physical features of the country to the north and south of the water-shed.

* Forbes' Travels through the Alps, p. 18.

Corrections to notes on Land and Fresh Water Shells, collected in Afghanisthan. By Capt. THOMAS HUTTON.

By a letter lately received from W. H. Benson, Esq., I find that the following corrections are required to my notes on Afghan shells, published in the July number of this Journal for 1849 ; many changes having lately taken place in regard to the names bestowed by writers in India.

No. 1. for "Parmacellus"—read "*Parmacella.*"

No. 4. Helix Bactriana (Hutton). Dr. Pfeiffer regards this as only a variety of the European *H. strigella.*

No. 8. Pupa spelœa (Hutton). According to the present classification this will stand as *Bulimas spalœus* (Hutton), unless it has been previously published by Mr. Benson as *B. eremita.*

No. 9. Pupa Indica (Benson's Mss.)
P. cylindrica (Hutton), now stands as *Bulimus pullus* (Gray).

No. 10. Pupa cœnopicta (Hutton), is now *Bulimus cœnopictus.*

No. 11. for "shell convid"—read "*Shell conoid.*"

No. 16. Melania elegans (Benson), is now *M. spinulosa* (Lamarck).

No. 17. M. pyramis (Benson), is *M. tuberculata* (Muller).

On the Aborigines of the Eastern Frontier.—By B. H. HODGSON, *Esq.*

In continuation of my papers already submitted to the Society having in view to exhibit summarily the affinities of all the aborigines of India, I now submit Vocabularies, uniform with their precursors, of the written and spoken Burman, the Singpho, the Nága in three dialects, the Abor and the Miri tongues.

For this series I am indebted to the Rev. N. Brown of Sibsagor, who in forwarding it to me favoured me with the following remarks :—

"These specimens appear fully to establish the fact that the *Burman, Singpho, Nága* and *Abor* languages are very close relatives, and ought not to be separated into different families, as they sometimes have been. The Burman and Singpho, it is true, have been regarded as nearly related ; but I am not aware of its ever having been supposed that the Nága or Abor were closely related to the Burman, or that there was any

very intimate connexion between the two. The Nága tribes are very numerous, and every village appears to have its own dialect.

I have not inserted the Khamti or Shyán because I am not convinced that there is any very close radical connection between either and the Burmese. This affinity seems always to have been taken for granted as a matter of course, but without any just ground. It is true there are a considerable number of Burman words in the Khamti, but they bear the marks of recent introduction, and are not to be found in the old Ahóm, the parent Shyán, nor in the Siamese, with which the Ahóm was nearly, if not exactly, identical. I have inserted the Burmese as *written* together with the spoken *form*. The Mags of Arakán, it is said, pronounce it *as it is written*, and not like the Burmese. It appears to resemble the Tibetan considerably. The 1st column of Abor Miri I have collected from a vocabulary published a year or two ago by Captain E. F. Smith (of the Bengal Native Infantry), commanding at Sadiya. —The last column I got from a Miri residing at this place.

In Burman I have used *th* to express the sound of th in *think*. Also a stroke under the initial letter of a syllable to denote the falling tone, and a dot under the final vowel to deuote the short, abrupt tone. The Singpho and Namsang Nága are taken from a vocabulary published several years ago by the Rev. M. Bronson, and may be depended on as correct. The other two Nága dialects are given by two men from villages near Nowgong—the only Nágas I can find in the station just now; and, as they do not understand Asamese very well, I may have introduced some errors from them. At all events, the words are evidently encumbered with affixes and prefixes that do not properly belong here. I have not however ventured to remove any of them, as you will be better able to do this. I am inclined to think that the radical forms in all these languages are monosyllabic, as the Burmese unquestionably is. The verbs, &c. would probably show a much greater resemblance if we had all the terms for each idea; as there will generally be many verbs nearly synonymous; consequently the lists do not always exhibit the corresponding forms; thus creating an apparent difference when there is none iu reality."

As it is not my purpose to anticipate the results of the present inquiry, I will add nothing on this occasion to the above obliging and sensible remarks of Mr. Brown.

English.	*Burman, Written.*	*Burman, Spoken.*	*Bronson's Singpho.*	*Bronson's Namsang Naga.*	*Nowgong Naga.*	*Tengsa Naga.*	*Capt. Smith's Abor-Miri.*	*Sibsagor Miri.*
Air	lé	lé	mbung	póng	mabung	mapung	asar	esár
Ant	parwakchhit	payuetseik	gagin	tsipchák	machá	mathán	mirang	meráng
Arrow	*m*rá	*m*yá	pelá	látchan	lasang	lasan	epuk	epug
Bird	nghak	nghet	wu	vó	üzz	usó	pettang	pátáng
Blood	*s*wé	*th*wé	sai	hé	azü	ái	yilpi ui	iye
Boat	lhé	lhé	lí	khuonkhó	surung	lung	ellóng	óllungá
Bone	aró	ayó	nráng	áráh	terap	telet	álong	álong
Buffalo	kwye	kyue	ngá	lé	chang	tyang	menjek	menjeg
Cat	krong	kyaung	ningyau	míang	tanü	meyau	mendari	menkuri
Cow	*n*wá	*n*uá	kansú	mán	nasi	másí	gúrúshameh	góru
Crow	*k*yí	*k*yí	kokhá	vakhá	waru	walo	piák	püag
Day	né	né	ningthói	rangyí	....	tünglú	longeh	longko
Dog	*k*hwé	*k*hwé	gui	hú	azz	arh	ekí	iki
Ear	*n*á	*n*á	ná	ná	tenaung	telánnu	norong	yerung
Earth	mré	myé	nggá	há	áli	áli	ámong	ámong
Egg	u	u	údi	atí	antsü	utü	ápíu	apü
Elephant	chhang	s'hen	magui	puok	shití	sutí	sita	site
Eye	myakchi	myetsi	mi	mit	tenok	tenyik	ámik	amik
Father	phaé	phá-é	wá	vá	upá	apu	yiai	bábá
Fire	*m*í	*m*í	wau	van	mí	masi	eme	umme
Fish	*n*gá	*n*gá	nga	ngá	angu	angu	engo	orgo
Flower	*p*an	*p*án	siban	chóngpó	naru	nolong	ápun	ápun
Foot	khré	khyé	lagóng	dá	tatsüng	taching	ále	ále
Goat	chhit	s'heik	bainam	kien	nabung	nabung	shuben	ságoli
Hair	chhaubang	s'haben	kará	kachó	kó	ku	dumit	dumed
Hand	lak	let	lettá	dak	tekhá	tekhát	áiák	elág
Head	*kh*ong	*gh*aung	bóng	khó	takolák	teko	tuku, mittuk	mittub
Hog	wak	wet	wá	vak	ák	ák	yúek	eyeg
Horn	khyo	ghyó	rung	róng	tazzü	tái	áreng	áreng
Horse	mrang	myen	gumrang	mók	kórr	kuri	góre	gure
House	im	eing	ntá	hum	kí	kí	ekum	ekum

English.	*Burman, Written.*	*Burman, Spoken.*	*Bronson's Singpho.*	*Bronson's Namsang Naga.*	*Nowgong Naga.*	*Tengsa Naga.*	*Capt. Smith's Abor-Miri.*	*Sibsagor Miri.*
Iron	san	*thán*	mpri	jan	yin	yen	yagurah	yogir
Leaf	rwak	yuet	láp	nyáp	ám	ám	anné	ekamane
Light	*lang*	*len*	ningthói	rangvó	tsángurh	sangagho	piuáng	püáda
Man	lú	lú	singpho	minyán	nyesung	mésung	amie	ámme
Monkey	myok	myauk	woé	véh	shitsü	suchí	sibeh	shibe
Moon	la	lá	sitá	dá	yitá	lutá	paló	polo
Mother	ami	ami	nú	ingyóng	uchá	ápü	namu	náná
Mountain	tong	taung	bum	háhó	min áram	masan	ádí	ádi
Mouth	nhup	nhók	ninggup	tun	tepang	tabáng	napang	napüng
Musquito	khyang	khyen	tsigrong	mang dổng	merila	anjang	songgóu	tamig
Name	ami*n*	amí	ming	min	tenung	tenying	ámin	ámin
Night	nyí*n*, nya	nyin, nyá	siná	rangpan	aunu	ásangdi	kamogah	kammo
Oil	achhí	s'hí	nam án	táuthí	tótsü	mángá	tuláng	tuláng
Plantain	nghakpyo	nghetpyo	lungu	kieke	samum	mongo	kópagü	kopage
River	mrach	myit	khá	jóan	tsülátsü	tülá	asie	abunge
Road	*lam*	*lán*	lám	lam	lemang	unglan	lambeü	lámte
Salt	*ch*há	*s'*há	jum	sum	matsü	machi	ńlu	állo
Skin	*sá*ré	*th*áyé	phi	ákhuon	takap	takap	dumóer	asüg
Sky	*mó*gh	*mó*	mu	rángtung	mabat	phumching	teong	domür
Snake	mrwé	myué	lapú	pú	pürr	phalü	....	tábbe
Star	kre	kye	sigan	mérik	pitinu	lutingting	tákár	tákár
Stone	kyok	kyauk	nlung	lóng	lungzük	lungmanggo	iling	ilüng
Sun	né	né	ján	sán	ánnü	tinglü	dunié	donnye
Tiger	kyá	kyá	siróng	sá	kayi	khü	simiü	sümyo
Tooth	*s*wá	*th*wá	wá	pá	tabu	taphu	ípáng	áie
Tree	apang	apen	phun	bang	santung	sangtung	esing	ising
Village	rwá	yuá	mereng	há	yüm	yam	dulong	dolüng
Water	ré	yé	ntsin	jó	tsü	tü	ńssí	áche
Yam	myok	myauk	nai	hákhuon	shi	chu	ngunü	álie
I	ngá	ngá	ngai	ngá	nyí	ngai	ngo	ngo
Thou	nang, mang	nen, men	náng, ní	nangmá	ná	nang	nóna	no

English.	*Burman Written.*	*Burman, Spoken.*	*Bronson's Singpho.*	*Bronson's Namsang Naga.*	*Nowgong Naga.*	*Tengsa Naga.*	*Capt. Smith's Abor-Miri.*	*Sibsagor Miri.*
He	sú	*th*ú	khí	até	pá	pá	bü	bu
She	ditto	ditto	....	....	pá	pá	no	....
It	....	....	....	....	....	....	....	....
We	ngátó	ngadó	í	nímá	annok	akhala	ngolu	ngosin
Ye	nangtó	nendó	nítheng	némá	nákara	nakhala	nolu	nolüsin
They	sútó	*th*údó	khíní	sening	yau	tebepá	bülu	üllü bülu
Mine	ngái	ngái	ngéná	ngá	ka	ngaichi	ngoke	ngokke
Thine	mangi	meni	náná	má	ná	mechi	nókke	nokke
His	súi	*th*úi	khíná	até	pá	páchi	bükke	hükke
Ours	ngátói	ngadói	....	....	ásan	akhali	....	ngolükke
Yours	mangtói	mendói	....	....	nü	nakhalá	....	nolükke
Theirs	sútói	*th*údói	....	....	pári	páli	bulüke	bülükke
One	tach	tit, ta	aimá	vánthé	katang	khatu	ako	átero
Two	nhach	nhit	nkhong	ványí	anna	ánnat	aniko	ngoye
Three	*s*ung	*th*óng	masúm	vánram	ásam	ásám	aomko	auma
Four	*lé*	*lé*	melí	belí	pazr	phále	apiko	ápie
Five	*n*gá	*n*gá	mangá	bangá	pungu	phungu	pilingoko	üngo
Six	khyok	khyauk	krú	írók	tarok	thelok	akeko	ákünge
Seven	khwan nhach	khunnhit	sinit	íngit	tanet	thanyet	kunítko	künnide
Eight	rhach	shyit	matsat	ísat	te	thesep	punitko	pi*n*ye
Nine	*kó*	*kó*	tsekhú	íkhu	taku	thaku	konangko	konánge
Ten	chhe	s'he	sí	íchi	tarr	thelu	üingko	üyinge
Twenty	nhachchhe	nhits'he	khún	ruakngi	matsü	machi	irlingko	üying ányiko
Thirty	*s*ungchhe	*th*óngzhe	tumsí	ruakram	....	machi lithelu	üing aomko	üying aumko
Forty	*lé*chhe	*lé*zhe	mlísí	ruakbelí	liri	mesung annat	üing apie	üying apiko
Fifty	*n*gáchhe	*n*gázhe	mangásí	ruakbangá	thanam	mésung annat té thelu	....	üngo üyingko
Hundred	tará	tayá	latsá	cháthe	rokrü	mésung phun-	....	üying üyingko
Of	i (affix)	i	na (affix)	wanting	....	.... [gu	met	....
To	*á*	*á*	fe	nang	tang	nai	telópu	lope
From	ka	ga	....	....	....	....	odánkáng	lokke

English.	*Burman, Written.*	*Burman, Spoken.*	*Bronson's Singpho.*	*Bronson's Namsang Naga.*	*Nowgong Naga.*	*Tengsa Naga.*	*Capt. Smith's Abor-Miri.*	*Sibsagor Miri.*
By	phrang	phyen	....	....	wá	nü	umnus	appünge
With	nhang	nhen	....	....	yasü	süga	....	logolo
Without	....	....	....	....	....	....	....	....
In	nhaik	nhaik	kátái	hum nyu	lóng	atap	áráng	árálo
On	pomhá	bomhá	lethá	ákhónang	talak	tathak	teó só	talülo
Now	yakhu	yakhu	yá	dókko	tang	thong	supáb	su
Then	thó akhá	thó akhá	....	....	tas au	kabáng	....	kojo
When?	bhesokhá	bhe*th*okhá	yango	matu suanta	kódang	kápá	....	üdilo
To-day	yané	yané	daíní	tajá	tannu	thanglu	silo	silo
To-morrow	nakphan	netphán	mphóní	ninap	asóng	ásang	iámpo	yampo
Yesterday	yamanné	yamanné	maní	majá	yashí	ósí	milo	melobo
Here	símhá	*th*ímhá	náde	anang	yóng	iga	sho	so
There	hómhá	hómhá	tode	dinang	aunchi	ótiga	....	ülo
Where?	bhemhá	bhemhá	gadégui	makóa	kóng	ótiga	ungkolo	okolon
Above	apo mhá	apo mhá	ning tsang	ákhónang	talak	tathak	taleng	talüto
Below	okmhá	aukmhá	katái	akhannang	tasung	tachung	rumking	rümkübe
Between	a*k*rámhá	a*k*yámhá	....	....	kimá	ulam	radang	áráso
Without	prángmhá	pyenmhá	....	vákánang	tamá	má	lulo	rongongolo
Within	atwang	atwen	....	....	talóng	atap	úráso	áráso
Far	*w*é	*w*é	tsán	háló	talang	lánglá	. ..	modo
Near	*ní*	*ní*	ní	therkó	tatsaka	annanglá	aninda	ánünse
Little	chhitkha*l*é	seikkha*l*é	katsí	achá	íshika	tesu	....	íjoda
Much	*m*yá	*m*yá	lo	ájá	ayüka	tebe	....	ábako
How much?	bhelok	bhelauk	gadémá	chento	kayüka	katekat	eritko	üdüko
As	kesó	ge*th*ó	....	....	....	....	....	....
So	ló, só	ló, *th*ó	....	....	....	....	depü, au	sempidang
Thus	thósó	thó*th*ó	ndaisat	árarang	ányakáng	atti	pua	ümpe
How?	bhesó	bhe*th*ó	....	....	kótau	katikiang	káppida	kapü
Why?	bhepruló	bhepyuló	fári	rétó	kashia	kadó	okkiduna	kappü
Yes	hótkhe	hókhe	raia	idanga	au	ho	iü	ü
No	mahut	mahók	galai	má	mau, nonga	nongo	mámá	má

English.	*Burman, Written.*	*Burman, Spoken.*	*Bronson's Singpho.*	*Bronson's Namsang Naga.*	*Nowgong Naga.*	*Tengsa Naga.*	*Capt. Smith's Abor-Miri.*	*Sibsagor Miri.*
No, not	ma(pru)nhang	ma (pyu) nhen	ng,phung	nak	(tók) n' (shi)	(tha) m' (thi)	ioka	yoka
And, also	lín *k*ong	*lí*gaung	....	....	....	....	aiu	....
Or	sómahut	*th*ómahók	....	....	....	....	....	....
This	í, si*n*	í, *thí*	ndai	ára	yáe	igáká	sí, issi	shidebulu
That	thó, hó	thó, hó	orawá	írapá	au*n*chika	óchika	iüna	üllübullu
Which ?	abhe	abhe	gadénuá	mapá	yákung	kachi	ing kóno	okolone
What ?	abhe	abhe, bhá	phakaimá	chená	kachisür	chaba	ingkua, ong kokko	okko
Who ?	bhesú	bhe*th*ú	gadaimá	hauá	sirau	sinê	sekó	seko
Any thing	bhemhya	bhámhya	....	....	....	....	anjoko	okko
Any body	bhesúmhya	bhe*th*úmhya	....	....	....	....	....	sekodi
Eat	chá	*sá*	sháu	cháo	chijóng	tyu	dol anka	dolangka
Drink	sok	*th*auk	luu	jóko	chajamti	tünun	taipü	tüpu
Sleep	ip	eik	yúpu	júpo	annanü	annü	iddo	yüm
Wake	*nó*	*nó*	dúmu	chingo	ula	phayá	emü aipü	dárdoku
Laugh	re	ye	maníu	ngío	mannü	mannü	nilodopü	yírda
Weep	ngó	ngó	khrápu	sapo	áchaprr	chappale	kappü	kapda
Be silent	titchhit né	teiksheik né	temdingau	....	manakazong	ayok sulang	ásopü	ásopa
Speak	pro, chhó	pyo, s'hó	súu	thóo	shang	suang	lüpü	saluto
Come	lá, rok	lá, yauk	sáu	káro	arung	ahalü	giküpü	kápü
Go	swá, kwya	*th*wá, kyuạ	wán	káo	tsu, wang	chennang	gupü gikangka	sá
Stand up	tha, mat	thá, mát	tsapu } rotu }	chapo	nótak	septak	dangküpü	dárup
Sit down	thaing	thaing	dúngu	tóngo	manákarü	mannang	dúpü	dutoka
Move, walk	*l*e, kwya	*l*e, kyuạ	thotu, damu	chóo, khuams	asámataur	asambat	iokoda	gümaudak
Run	pré	pyé	gagátu	chuano	sámawaung	á ásambat	dukpü	dupdandak
Give	pékhya	pé khyạ	yáu	kóo	kwáng	khalang	bípü	sopá
Take	yú	yú	láu	kapo	niagirr	{ chiokko } ánno }	lápü	láto
Strike	raik, put	yaik, pók	dúpu	váto	{ tatsungr } tatapsap }	taphetokó	pápü	düto

English.	*Burman, Written.*	*Burman, Spoken.*	*Bronson's Singpho.*	*Bronson's Namsang Naga.*	*Nowgong Naga.*	*Tengsa Naga.*	*Capt. Smith's Abor-Miri.*	*Sibsagor Miri.*
Kill	sat	*th*át	satu	rikváto	ásoko	áseko / síyang	pápu	dingketo
Bring	yúkhe	yúghe	láu	vanro	ányaung	khaluang	bombipu	bomkuka
Take away	yúswá	yú*th*wá	láu wáu	kapkáto	penruang	cheba chenang	bomkang	bomkang
Lift up	mhrang, mhrok	mhyen, mhyauk	phónu	tuons	achóngatóng	aiyóang	lássápü	jowon
Hear	*k*rá	*k*yá	nángu	táto	ááshu	ángáng	tadkapü	táttoka
Understand	li*n*, si	le, *th*i	chóiu	íjáto	matürrmá	nyangmang	ken	kintoka
Tell	chhó, *k*rá	s'hó *k*yá	súu	ngáo	shiang	suang	lüpü	lubida
Good	*k*ong	*k*aung	gajá	asan	tatsóng	chóngkolo	aidu	aida
Bad	*ch*hó	*s*'hó	ngaiá	achí	matsóng	machóng	aimang	aima
Cold	khyam, é	khyán, é	katsí	aki	káásütá	áchikale	ansinge	ansinge / sikkire
Hot	pú	pú	káthet	akhám	tatsok	lamme	gudórong	gunáme
Raw	chim	seing	ketsing	áhing	mátók / tazzu	tái	....	leda
Ripe	mhi*n*, rang	mhe, yen	min	áchúm	táman	táman	mindó	minda
Swect	khyó	khyó	dúi	átú	tánang	tánang	tídó	tídák
Sour	khyi*n*	khyin	khrí	ási	tásan	senla	kune	kudák
Bitter	*k*há	*k*há	khá	akhá	paklá	paklá	kónam	kodák
Handsome	lha	lhá	jásói	asaná	kángatsóng	chongthang	kampodó	kángkáne
Ugly	arup chhó	ayókshó	samnáng	pangtsí	matsóng	machóng	....	aimang
Straight	phrong	phy aung	preng	áting	tumutum	matungkolo	pundu	guyokdák
Crooked	kok	kauk	mágo	akuang	tikrak	kóikolo	muwat, gadó	gudák
Black	nak	net	cháng	anyak	tanak	nyakla	yákár	yákádák
White	phrú	phyú	phróng	apó	tamasóng	masang	asidó	kámpodák
Red	ní	ní	khyeng	achak	maram	malamla	yalung	lüdák
Green	chim	seing	ketsing	ahing	tacham	tacham	....	gedák
Long	rhi*n*	shé	gálú	álo	talang	lángkolo	baddoló	aiárdák
Short	tó	tó	kutún	atóon	tatsü	ánanglá	adedi	ándüdák
Tall	mrang	myen	tsode	achuong	talángka	lánglá	....	aiárdák

English.	*Burman, Written.*	*Burman, Spoken.*	*Bronson's Singpho.*	*Bronson's Namsang Naga.*	*Nowgong Naga.*	*Tengsa Naga.*	*Capt. Smith's Abor-Miri.*	*Sibsagor Miri.*
Short	nim	neing	kutún	amienpa	tatsü	ánanglá	adedi	ándüdák
Small	nge	nge	katsí	áring	tilala	tesu	angidó	ámedák
Great	*k*rí	*k*yí	gubá	adóng	talulu	tapé	bóte	áttadák
Round	*l*un	*l*óng	dindin	átúm	tarang	litükpu	....	átumdák
Square	*l*éthong	*l*édhaung	....	....	tangakáku	tangik	....	....
Flat	*p*yá	*p*yá	ram	tode	matam	madamka	neing sudó	omandák
Fat	wa, tup	wạ, tók	phúm	atat	tabók	tabók	udó	juiname
Thin	lhyá	shyá	lasí	achá	apoprr	apo	....	gídák
Weariness	mo, pang*b*an	mo, pen*b*án	báhá	bóan	ányokó	ngüchaho	....	amírse / molámak
Thirst	ré ngat	ye ngát	pháng gerá	khamlán	tukula / seratür	chebalé / chuale	tuling	tülüng
Hunger	*ch*há ngat	*s*ángát	kosíu	ramrío	yatür	chulale	kinong	konóng

"In Burman I have used *th* to express the sound of th in *think*. I have also put in italics the initial letter of a syllable to denote the falling tone—and a dot under the final vowel to denote the short, abrupt tone. The Singpho and Namsang Naga are taken from a vocabulary published several years ago by the Rev. Mr. Bronson, and may be depended on as correct. The other two Naga dialects are given by two men from villages near Nowgong—the only Nagas I can find in the station just now; and as they do not understand Asamese very well, I may have introduced some errors from them. At all events the words are evidently encumbered with affixes and prefixes that do not properly beloug here; I have not however ventured to remove any of them, as you will be better able to do this. I am inclined to think that the radical forms in all these languages are monosyllabic, as the Burmese unquestionably is. The verbs, &c. would probably show a much greater resemblance if we had all the terms for each idea; as there will generally be many verbs, nearly synonymous, consequently the lists do not always exhibit the corresponding forms —thus creating an apparent difference where there is none in reality."

On preparing Fac-similes of Coins, &c.—By J. W. Laidlay, *Esq.*

Convenient, expeditious, and easy methods of making fac-similes of coins, gems and inscriptions have ever been objects of importance to the antiquarian and the traveller; and as several of my correspondents have found those which I am about to describe, and which I have practised for some time past, to possess all these advantages, it may not be amiss to devote a short space in the Journal to make them more generally known.

To prepare fac-similes of coins and medals, the operator should have in readiness a few balls of yellow bees'-wax, and a little plumbago in fine powder. The former may vary in size from that of a small pistol bullet upwards, according to the size of the medal to be copied, and may be kept in readiness for use in a wide-mouthed phial. One of these waxen balls having been selected, is to be flattened by pressure upon a small disc of wood or copper (an old smoothworn pyce answers extremely well), which serves as a support for it, and prevents its subsequent alteration of form by keeping. The wax thus flattened and extended to about the size of the medal to be copied, is to be rubbed on its surface with a little of the powdered plumbago applied by means of the finger. It will immediately assume a high metallic polish, and is then ready to receive the impress of the coin. This is effected by simply laying the latter upon the wax, and pressing it into the polished surface, either with the thumb, or by means of a large pair of pincers, or by any other process ensuring a uniform steady pressure. When the impress is considered perfect, the coin is easily detached by a slight tap, there being seldom any disposition to adhere, if sufficient plumbago be employed, and more especially if the coin be breathed upon, or moistened, before the operation.

On removing the coin, the wax will be found to have received a beautiful and delicately perfect impression by a process mechanically analagous to that by which the original itself was formed. This process will be found greatly superior to those given in books, such as that by means of sealing wax, or plaster of Paris, or melted stearine. The first is generally deficient in sharpness; the last often causes vexation by the adhesion of the medal, or the formation of bubbles on

its surface; while none of them is so expeditious as the one I now describe, by means of which fac-similes of an extensive cabinet of medals may be obtained in a few hours.

The waxen matrices thus prepared may, with proper precaution, be kept an indefinite time, or transmitted to any distance for the final process, that is, the revival of the medal by electrotype deposit. When this is to be done, a little more powdered plumbago should be brushed to and fro upon the mould with a rather stiff painting brush, and then well cleaned away. This serves to restore the continuity of the conducting surface where it may be broken by the impression; a circumstance very likely to occur where the legend is in high relief. A hot wire being now passed round the edge of the matrix to destroy the electric connection with the metallic support, renders the mould fit for placing in the depositing trough, where the process is completed in the usual way.

I had the honor to submit to the Society specimens of electrotype fac-similes prepared in this manner about two years ago. It is obvious however that this process is applicable to many other objects and purposes besides the copying of coins. Wood-cuts and other engravings in relief may be multiplied in the same manner; and even stereotype plates of letter-press may be similarly prepared with the utmost facility. All that is requisite is to expose a prepared surface of wax laid upon the type-forms to gentle pressure, and submit the impression thus obtained to the action of the electrotype. I have the honor to lay before the Society a specimen of this mode of stereotyping, being a page from the Veda, prepared by the indulgent permission of the Rev. J. Thomas of the *Baptist Mission Press*. This *first* attempt, made now more than a year ago, sufficiently testifies the ready practicability of the process. I had occasion about the same time, in reply to some questions from my esteemed correspondent, the Rev. Dr. Gutzlaff of Hong Kong, regarding the application of stereotype to Chinese printing, to recommend this process to his consideration as one eminently adapted to the special case of copying wooden blocks. I have not yet heard the result of his experiments, but have no doubt of their eventual success.

It now only remains to describe the method of taking paper fac-similes of inscriptions. The ordinary mode of doing this by inking the surface, either with common or printing ink, has the disadvantage

of giving a reversed copy of the original, and has other, and those considerable, inconveniences which are troublesome enough in practice. My friend Capt. Kittoe, who has had more experience in this department of practical archaiology than falls to the lot of many, improved the process greatly by overlaying the sheet of paper upon which the impression is to be taken with another prepared with a proper pigment, and then applying the requisite pressure or friction; precisely as is done in copying by what is called "carbonic paper." This had the advantage of giving the impression erect: but the following is much simpler, more expeditious and more cleanly;—Lay the paper upon the inscribed surface and rub it with a large cork primed with powdered plumbago; wherever the surface resists, the plumbago adheres and may be fixed by freely rubbing in. The excised parts receive no impression. The fac-simile thus prepared may be afterwards improved if necessary by pen and ink. The process, however, is capable of such delicacy and exactness, that with fine paper, it may be used to copy in fac-simile the slightly depressed lettering on the back of a book. The powdered plumbago may be kept for the purpose in a wide mouthed phial, the cork of which will always be ready for use.

PROCEEDINGS

OF THE

ASIATIC SOCIETY OF BENGAL

For August, 1849.

The ordinary meeting of the Asiatic Society held on Wednesday, the 5th of September, 1849.

Dr. J. McClelland, Senior Member present, in the chair.

The proceedings of the last meeting were read and confirmed, and the accounts and vouchers of the preceding month were laid upon the table as usual.

Raja Pratapa Chandra Singha, Babu Rajendra Dutto and *Captain E. Fytche,* having been proposed and seconded at the August meeting, were ballotted for and elected ordinary members of the Society.

Read letters—

From Sir H. M. Elliot, K. C. B. Secretary to the Government of India with the Governor General, forwarding "Diary of a Trip to Pind Dadun Khan and the Salt Range," by Mr. Assistant Surgeon A. Fleming.

From H. Cumming, acknowledging the receipt of a bill of exchange for £25-10-0, and soliciting the attention of the Secretary to a promise made by him for transmitting to Mr. C. a selection of duplicate shells in return for those already received by the Society in 1843.

From Lieut. R. C. Wroughton, expressing, on behalf of himself and other surviving relatives of Brigadier Stacy, their heartfelt thanks for the sympathy of the Society on the occasion of the death of that eminent antiquarian, as conveyed in their resolution of September, 1848.

From Col. J. Low, forwarding the original stone containing the facsimile of an inscription published in the Journal of the Asiatic Society for July, 1849.

John Barlow, Esq., Secretary to the Royal Institution of Great Britain, conveying the thanks of the Institution for a copy of the Asiatic Society's Journal, No. 199.

From Major W. Anderson, a paper on the "Routes and Stages in the North Western provinces of India in 1750."

From the same, "Sketch of the recorded revenues of the states beyond the Sutlej, about 1750 to 1800."

From H. Piddington, Esq. Charts of his 17th and 18th Memoirs of the Law of Storms in India.

Read extract of a letter from Lieut. R. C. Wroughton, intimating his desire, with reference to a para. in Brigadier Stacey's will, to dispose of, if there be any, the stones, sculptures and old copper-plate gift of land belonging to Brigadier Stacy in the Society's Museum.

Read extract of a letter

From Mr. Gutzlaff, returning his thanks to the Society for the Tibetan books presented to him.

The Report of the Council upon the Financial condition of the Society, having been in pursuance of the resolution of the preceding meeting, brought forward for consideration, after some discussion, the following resolution was proposed by Mr. Newmarch, seconded by Mr. Heatly, and carried,

"That the Financial Report of the Council be adopted with the following modifications, that is to say, that the allowance hitherto made to Mr. Blyth of 40 Rs. per month in respect of house rent be continued, and that the Librarian's salary be continued at 100 Rs. per month instead of 50 Rs. per month, as proposed by the Council; also that in the Zoological department one assistant be retained on 20 Rs. per month, one taxidermist on 30 Rs. per month, and one other taxidermist on 15 Rs. per month, instead of the establishment proposed by the Council of 2 taxidermists each at 30 Rs. per month; and that 2 Durwans be retained instead of one only, as proposed by the Council.

J. W. Colvile.

Read and confirmed, Dec. 8th, 1849. J. W. Laidlay.

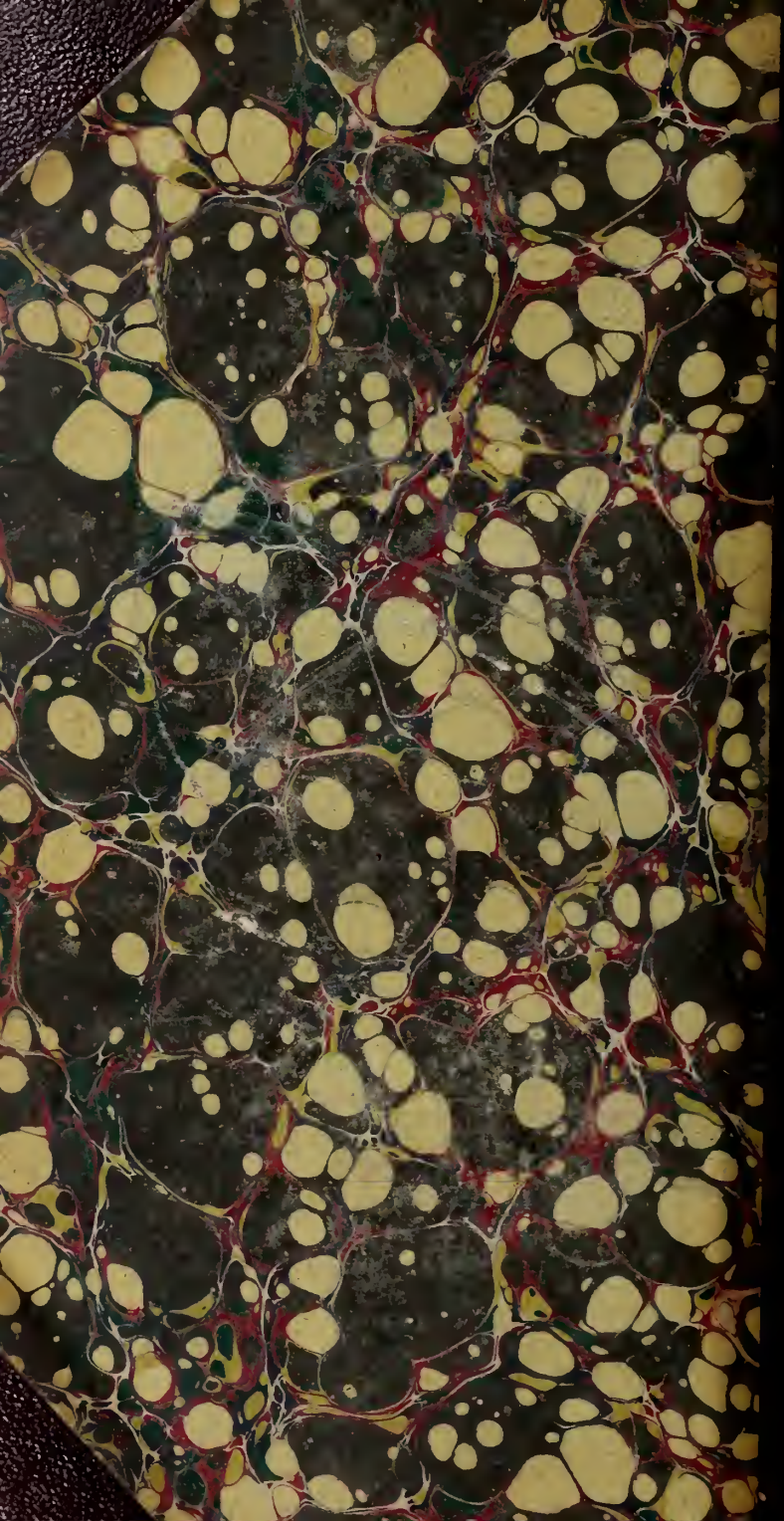
Erratum in the last number,—page 858.

For "Dr. J. M'Lelland in the chair," read "The Hon. the President in the chair."

Meteorological Register kept at the Surveyor General's Office, Calcutta, for the Month of Sept., 1849.

Date.	Observations made at sunrise. Bar. red. to 32° F.	Temperature. Of Mer.	Temperature. Of Air.	Temperature. W. Bulb.	Wind.	Aspect of Sky.	Maximum Pressure observed at 9h. 30m. Bar. red. to 32° F.	Temperature. Of Mer.	Temperature. Of Air.	Temperature. W. Bulb.	Wind.	Aspect of Sky.	Observations made at apparent noon. Bar. red. to 32° F.	Temperature. Of Mer.	Temperature. Of Air.	Temperature. W. Bulb.	Wind.	Aspect of Sky.
	Inches	°	°	°			Inches	°	°	°			Inches	°	°	°		
1	29.540	80.4	81.2	80.0	E.	Zenith clear	29.601	90.0	89.0	83.5	E. S. E.	Cumulo stratu	29.562	92.7	90.5	82.0	E.	Nimbi
2S	.596	80.2	81.0	80.0	E. N. E.	Cloudy	.642	89.7	88.8	82.2	E. S. E.	Ditto	.617	92.1	90.8	83.3	E. N. E.	Cumulo stratu
3	..	..	..	..	....	....	..	..	..	..	....	..	..	..	..	..	....	....
4	.670	79.8	80.7	79.4	E.	Cirro stratu	.717	89.9	87.7	81.8	E.	Cumulo stratu	.694	88.9	87.6	80.8	S.	Cumulo stratu
5	.665	79.7	80.5	79.0	S.	Ditto	.697	90.3	88.8	82.0	S. S. E.	Ditto	.669	92.4	90.0	81.7	S.	Ditto
6	.672	80.7	81.5	80.3	S. W.	Ditto	.739	90.2	88.0	80.9	S.	Ditto	.710	92.9	90.1	82.6	S. E.	Ditto
7	.742	80.3	81.0	79.3	S. E.	Cumuli	.801	89.2	87.6	81.2	S. E.	Ditto	.761	90.7	89.8	81.3	S. S. E.	Ditto
8	.777	79.9	80.4	79.0	E. N. E.	Cirro stratu	.797	87.1	85.8	81.0	E.	Ditto	.749	90.6	87.8	81.0	S. E.	Nimbi
9S	.703	79.2	80.0	79.0	E.	Cloudy	.734	87.2	83.0	80.8	S. E.	Drizzly	.693	81.8	81.0	78.0	N. E.	Cloudy
10	.655	79.7	80.2	78.9	E.	Cirro cumuli	.687	87.8	87.2	81.3	E.	Cumulo stratu	.634	90.8	88.9	81.3	E.	Cumulo stratu
11	.691	79.2	80.0	78.8	S. S. E.	Cirro stratu	.743	89.4	86.8	80.8	E.	Ditto	.694	90.4	90.0	83.5	N. N. E.	Ditto
12	.721	79.3	80.0	79.0	S. E.	Ditto	.752	87.8	85.3	80.9	E.	Ditto	.707	91.1	88.2	82.2	S. S. E.	Rainy
13	.649	79.7	80.0	79.0	S. E.	Clear	.685	89.8	86.7	80.7	S. E.	Ditto	.651	86.0	83.8	80.6	S. E.	Drizzly
14	.618	80.0	80.8	79.7	N. E.	Cirro cumuli	.655	88.7	86.4	80.5	N. E.	Ditto	.616	91.2	90.4	82.1	E.	Cumulo stratu
15	.610	80.1	80.8	79.2	N. E.	Ditto	.640	89.3	88.0	80.4	E.	Cumuli	.605	92.0	90.9	81.8	E.	Cumuli
16S	.625	80.4	81.3	79.1	E. N. E.	Cumuli	.666	89.0	88.0	80.3	E.	Cumulo stratu	.626	89.4	81.7	79.4	S.	Cloudy
17	.696	80.2	80.9	79.5	E.	Cumulo stratu	.757	85.0	84.3	80.4	E.	Ditto	.745	84.9	79.9	78.3	E.	Rain—Thund.
18	.710	78.5	79.2	78.5	S.	Cirro stratu	.736	88.9	87.5	81.9	S.	Ditto	.694	91.0	89.2	82.9	S. W.	Cumulo stratu
19	.636	79.8	80.5	79.5	S. E.	Ditto	.669	89.6	89.0	82.3	N. E.	Ditto	.623	92.3	91.3	82.0	N. E.	Ditto
20	.604	81.0	81.9	80.5	S.	Ditto	.655	91.2	89.2	81.3	E.	Ditto	.610	93.2	91.0	82.2	E. N. E.	Ditto
21	..	..	..	..	....	....	..	..	..	..	....	....	..	..	..	..	....	....
22	..	..	..	..	....	....	..	..	..	..	....	....	..	..	..	..	....	....
23S	..	..	..	..	....	....	..	..	..	..	....	....	..	..	..	..	....	....
24	..	..	..	..	....	....	..	..	..	..	....	....	..	..	..	..	....	....
25	..	..	..	..	....	....	..	..	..	..	....	....	..	..	..	..	....	....
26	..	..	..	..	....	....	..	..	..	..	....	....	..	..	..	..	....	....
27	..	..	..	..	....	....	..	..	..	..	....	....	..	..	..	..	....	....
28	..	..	..	..	....	....	..	..	..	..	....	....	..	..	..	..	....	....
29	..	..	..	..	....	....	..	..	..	..	....	....	..	..	..	..	....	....
30S	..	..	..	..	....	....	..	..	..	..	....	....	..	..	..	..	....	....
Mean	29.662	79.9	80.6	79.4	....	....	29.704	89.0	87.3	81.3	....	....	29.666	90.2	88.2	81.1	....	....

[Meteorological Register continued.]

Observations made at 2h. 40m.						Minimum Pressure observed at 4 p. m.					
Bar. red. to 32° F.	Temperature. Of Mer.	Temperature. Of Air.	Wind. W. Bulb.	Wind.	Aspect of Sky.	Bar. red. to 32° F.	Temperature. Of Mer.	Temperature. Of Air.	Wind. W. Bulb.	Wind.	Aspect of Sky.
Inches	°	°	°			Inches	°	°	°		
29.540	86.5	86.3	81.8	S. E.	Cloudy	29.515	85.9	85.0	82.0	E.S.E.	Cloudy
.561	86.3	85.0	80.2	S. E.	Drizzly	.510	87.6	86.2	81.4	N. E.	Ditto
..	..	..	..	....	....	..	..	..	..	..	....
.632	85.8	85.2	80.3	S. W.	Cloudy	.610	86.0	85.5	80.6	S.	Cloudy
.609	89.0	88.0	81.0	S.	Cumulo strati	.593	88.2	87.9	82.2	E.S.E.	Cumulo strati
.648	89.0	88.7	83.4	S. E.	Cirro cumuli	.632	90.0	87.5	81.7	S. E.	Cirro cumuli
.700	88.8	87.8	81.4	N. E.	Cumulo strati	.698	85.9	82.0	78.7	E.S.E.	Drizzly
.692	82.4	82.0	79.4	S.	Cloudy	.674	85.5	85.6	81.6	S.	Nimbi.
.624	83.8	83.0	80.3	S.S.E.	Rainy	.592	82.6	82.3	81.5	E.S.E.	Drizzly
.568	89.6	86.3	80.9	S.S.E.	Cumulo strati	.559	87.0	85.2	80.0	S.S.E.	Cumulo strati
.659	83.8	84.0	80.0	S. W.	Cloudy	.647	83.7	81.8	79.2	E.	Drizzly
.643	88.0	87.2	80.9	E.S.E.	Ditto	.621	88.1	86.9	80.5	S.	Cloudy
.557	92.8	91.5	81.7	E.	Zenith clear	.510	91.1	88.8	82.8	S.	Cumulo strati
.541	89.0	82.9	80.2	N. E.	Rainy	.535	83.5	83.9	81.0	S. E.	Cloudy
.538	94.0	91.6	81.6	E.	Cumulo strati	.525	93.2	91.4	81.1	E.	Cumuli
.596	86.4	84.9	80.4	E.	Cloudy	.590	84.9	81.8	79.1	S. E.	Drizzly
.676	81.2	81.2	79.2	S. E.	Drizzly	.678	80.8	80.7	78.5	S.	Ditto
.600	89.4	88.5	81.8	S.S.W	Nimbi	.599	86.8	86.3	80.4	S.S.W	Cloudy
.550	93.5	92.7	82.0	N. E.	Cumulo strati	.597	93.2	91.3	80.7	N. E.	Cumulo strati
.541	93.0	90.9	82.7	E.N.E.	Ditto	.533	92.8	90.5	82.0	E.N.E	Ditto
..	..	..	..	....	....	..	..	..	..	....	....
..	..	..	..	....	....	..	..	..	..	....	....
..	..	..	..	....	....	..	..	..	..	....	....
..	..	..	..	....	....	..	..	..	..	....	....
..	..	..	..	....	....	..	..	..	..	....	....
..	..	..	..	....	....	..	..	..	..	....	....
..	..	..	..	....	....	..	..	..	..	....	....
..	..	..	..	....	....	..	..	..	..	....	....
..	..	..	..	....	....	..	..	..	..	....	....
..	..	..	..	....	....	..	..	..	..	....	....
29.603	88.1	86.7	81.0	....	....	29.590	87.6	86.1	80.8	....	....

Observations made at sun set.						Maximum and Minimum Thermometer.				Rain Gauges.			
Bar. red. to 32° F.	Temperature. Of Mer.	Temperature. Of Air.	Wind. W. Bulb	Wind.	Aspect of Sky.	Max.	Mean.	Min.	Max. Therm. in sun's rays.	Feet. 40. Upper.	Feet. 4. Lower.	Moon's phases.	Date.
Inches	°	°	°			°	°	°	°	Inch.	Inch.		
29.522	83.1	82.9	80.7	S. E.	Scatter'd clouds	92.1	86.7	81.9	109.6	0.16	0.52		1
.570	85.2	85.0	80.7	S. E.	Rainy	92.0	86.5	81.0	109.7	0.10	0.52	○	2
..	..	..	..	....	....	..	..	..	..	0.26	0.34		3
.625	83.0	83.0	79.8	S. E.	Cirro strati.	90.4	85.4	80.4	105.8	..	..		4
.603	85.6	85.0	80.2	S.S.E.	Ditto	92.7	86.5	80.2	112.0	..	..		5
.639	86.8	86.3	81.2	S.	Cumuli	92.0	86.8	81.4	112.2	0.03	0.22		6
.726	82.8	82.0	79.9	E.S.E.	Scatter'd clouds	91.4	86.2	81.0	108.0	0.06	0.10		7
.695	82.3	82.0	80.0	S.	Cloudy.	90.8	85.7	80.5	109.3	1.06	1.12		8
.602	84.7	83.8	80.7	S. E.	Cirro strati	87.2	83.6	80.0	111.2	0.06	0.11		9
.585	83.3	83.0	80.3	S.S.E.	Scatter'd clouds	92.0	86.2	80.3	112.5	..	..	◐	10
.660	82.6	83.7	79.7	S.	Cirro strati	91.3	85.8	80.2	110.9	0.74	0.89		11
.634	85.7	83.9	80.1	S. E.	Zenith clear	91.0	85.5	80.0	111.2	0.94	1.04		12
.559	86.3	83.9	80.0	E.	Cloudy	93.4	86.8	80.2	116.8	0.05	0.08		13
.540	83.3	83.4	80.0	E.	Ditto	93.0	87.0	80.9	112.2	0.44	0.52		14
.533	88.8	88.4	81.0	E.	Clear	94.7	87.9	81.0	112.0	..	..	●	15
.613	82.2	82.2	79.2	E.	Scatter'd clouds	91.1	86.2	81.3	107.5	0.60	0.66		16
.664	80.0	80.2	78.3	S. E.	Cloudy	89.1	85.1	81.0	106.0	0.10	0.14		17
.606	85.2	85.0	81.3	E.	Cirro strati	92.1	85.5	78.9	113.0	..	..		18
.551	88.8	88.0	82.6	S. E.	Cumulo strati	93.9	87.3	80.6	119.4	..	..		19
..	..	..	..	....	....	94.0	88.0	82.0	112.0	..	..		20
..	..	..	..	....	....	..	..	..	..	..	..		21
..	..	..	..	....	....	..	..	..	..	..	..		22
..	..	..	..	....	....	..	..	..	..	6.38	..		23
..	..	..	..	....	....	..	..	..	..	0.22	..	☽	24
..	..	..	..	....	....	..	..	..	..	..	..		25
..	..	..	..	....	....	..	..	..	..	..	..		26
..	..	..	..	....	....	..	..	..	..	0.14	..		27
..	..	..	..	....	....	..	..	..	..	..	..		28
..	..	..	..	....	....	..	..	..	..	..	..		29
..	..	..	..	....	....	..	..	..	..	1.80	..		30
..	..	..	..	....	....	..	..	..	..	..	..		
..	..	..	..	....	....	..	..	..	..	..	..		
..	..	..	..	....	....	..	..	..	..	..	..		
..	..	..	..	....	....	..	..	..	..	..	..		
..	..	..	..	....	....	..	..	..	..	..	..		
..	..	..	..	....	....	..	..	..	..	..	..		
..	..	..	..	....	....	..	..	..	..	..	..		
..	..	..	..	....	....	..	..	..	..	..	..		
29.607	84.4	84.0	80.2	....	....	91.8	86.2	80.8	111.1	..	14.71